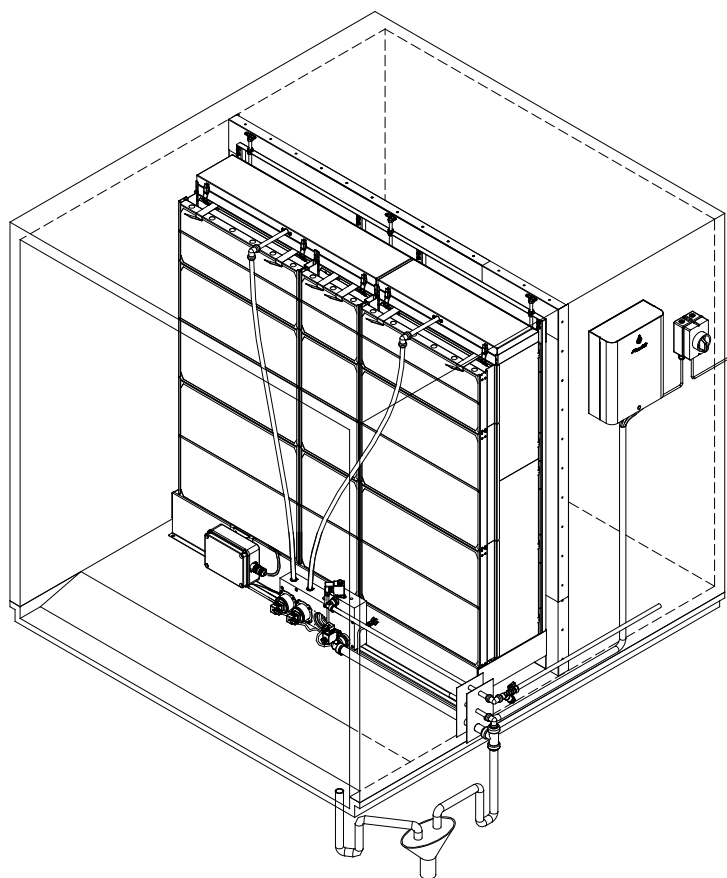




READ AND SAVE THESE INSTRUCTIONS

INSTALLATION AND OPERATION MANUAL

Adiabatic air humidification/air cooling system
Condair MC

Thank you for choosing Condair

Installation date (MM/DD/YYYY):

Commissioning date (MM/DD/YYYY):

Location ref.:

Model:

Serial number:

Fill in data at the commissioning!

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1 Introduction

1.1 General

We thank you for having purchased the **Condair MC Evaporative Humidifier and Cooler** (Condair MC hereafter).

To ensure a safe, proper, and economical operation of the Condair MC, please observe and comply with all information and safety instructions contained in the present documentation as well as in the separate documentations of the components installed in the humidification system. Improper use of the Condair MC may result in danger to the user or third parties and/or impairment of material assets.

If you have questions after reading this documentation, please contact your Condair representative. They will be glad to assist you.

1.2 Notes on the installation manual

Limitation

The subject of this manual is the Condair MC. The various options and accessories are only described insofar as is necessary for proper operation of the equipment. Further information on options and accessories can be obtained in the respective instructions.

This manual is restricted to the **installation, commissioning, operation and maintenance** of the Condair MC and is meant for **well trained personnel being sufficiently qualified for their respective work**.

Please note, some illustrations in this manual may show options and accessories which may not be supplied as standard or available in your country. Please check availability and specification details with your Condair representative.

Symbols used in this manual



CAUTION!

The catchword "CAUTION" used in conjunction with the caution symbol in the circle designates notes in this manual that, if neglected, may cause **damage and/or malfunction of the unit or other material assets**.



WARNING!

The catchword "WARNING" used in conjunction with the general caution symbol designates safety and danger notes in this manual that, if neglected, may cause **injury to persons**.



DANGER!

The catchword "DANGER" used in conjunction with the general caution symbol designates safety and danger notes in this manual that, if neglected, may lead to **severe injury or even death of persons**.

Safekeeping

Please safeguard this manual in a safe place, where it can be immediately accessed. If the equipment changes hands, the documentation must be passed on to the new operator.

If the documentation gets mislaid, please contact your Condair representative.

Language versions

This manual is available in various languages. Please contact your Condair representative for information.

2 For your safety

General

Every person working with the Condair MC must have read and understood this document before carrying out any work.

Knowing and understanding the contents of the manual is a basic requirement for protecting the personnel against any kind of danger, to prevent faulty operation, and to operate the unit safely and correctly.

All ideograms, signs and markings applied to the unit must be observed and kept in readable state.

Qualification of personnel

All work described in this manual **may only be carried out by specialists who are well trained and adequately qualified and are authorized by the customer.**

For safety and warranty reasons any action beyond the scope of this manual must only be carried out by personnel with appropriate industry recognized qualifications or training.

It is assumed that all persons working with the Condair MC are familiar and comply with the appropriate local regulations on work safety and the prevention of accidents.

Intended use

The Condair MC is intended exclusively for **air humidification and air cooling in AHU's or air ducts** within the specified operating conditions (see operation manual Condair MC). Any other type of application, without the written consent of the manufacturer, is considered as not conforming with the intended purpose and may lead to the Condair MC becoming dangerous.

Operation of the equipment in the intended manner requires **that all the information contained in this installation manual are observed (in particular the safety instructions).**

Preventing unsafe operation

All persons working with the Condair MC are obliged to report any alterations to the unit that may affect safety to the owner without delay and to **secure such systems against accidental power-up.**

Danger that may arise from the Condair MC



DANGER! **Risk of electric shock!**

The Condair MC unit (and the optional submerged UV system) contain live mains voltage. Live parts may be exposed when the control unit (or the terminal box of the optional submerged UV system) is open. Touching live parts may cause severe injury or danger to life.

Prevention: The control unit must be connected to the mains only after all mounting and installation work has been completed, all installations have been checked for correct workmanship and the covers has been relocated properly.



WARNING!

Evaporative material is manufactured from glass fibre. Though this material is not classified as hazardous, it is recommended that Personal Protection Equipment such as gloves, protective clothing and eye protection are used during handling to protect the user from fibres or dust. If dust is generated during handling it is recommended that respiratory protection is worn.



WARNING!

The UV lamps used in the Submerged UV system emit harmful UV-C rays that can cause lasting damage to eyes and skin.

Prevention: The lamps must be installed underneath the banks of the evaporative cassettes out of direct line of sight. Never operate the UV lamp outside the evaporative module.



WARNING! **Risk from mercury contaminated glass!**

The lamps used on the Submerged UV system are constructed and operated with technology similar to that of domestic, fluorescent lamps. The lamp is filled with gas and mercury vapor at low pressure and will not explode. However, if broken there will be a risk from mercury contaminated glass.

Prevention: Dispose of broken lamps separately in accordance with your local recycling/waste disposal laws and regulations.

Correct lifting and handling

Lifting or handling of components always carries an element of risk, and therefore must only be carried out by trained and qualified personnel. Ensure that any lifting operations have been fully planned and risk assessed. All equipment should be checked by a skilled and competent health & safety representative.

It is the customer's responsibility to ensure that operators are trained in handling heavy goods and to enforce the relevant lifting regulations.

Prohibited modifications to the unit

No modifications must be undertaken on the Condair MC without the express written consent of the manufacturer.

For the replacement of defective components use exclusively **original accessories and spare parts** available from your Condair representative.

3 Important notes

3.1 Inspection of the delivery

After receiving:

- Inspect shipping boxes for damage.
Any damages to the shipping boxes must be reported to the shipping company.
- Check packing slip to ensure all parts has been delivered.
All material shortages are to be reported to your Condair representative within 48 hours after receipt of the goods. Condair assumes no responsibility for any material shortages beyond this period.
- Unpack the parts/components and check for any damage.
It is particularly important that the tank, structural components, and fixings (such as studs) are inspected as damage to these items could affect the structural integrity of the system. If parts/components are damaged, notify the shipping company immediately.
- Check whether the components are suitable for installation on your site according to the product specification (refer to model key in the operation manual).

3.2 Storing/Transportation/Packaging

Storing

Until installation store the system components in its original packaging in a protected area meeting the following requirements:

- Room temperature: 1 ... 40 °C (34 ... 104 °F)
- Room humidity: 10 ... 75 %rh

Transportation

For optimum protection of the product, always transport the unit in its original packaging. The packaged Condair MC unit is able to be transported by trained personnel, using an appropriate lifting/transporting device from the underside.



WARNING!

The evaporative module **must not** be transported with the media cassettes fitted.



WARNING!

It is the customer's responsibility to ensure that operators are trained in handling heavy goods and that the operators comply with the appropriate regulations on work safety and the prevention of accidents.

Packaging

Keep the original packaging of the components for later use.

In case you wish to dispose of the packaging, observe the local regulations on waste disposal. Please recycle packaging where possible.

4 Specification

4.1 General

1. The humidifiers will comply fully with CE or UL Directives as appropriate.
2. The humidifier evaporative glass fibre material shall be A2-S2, D0 (UL Class 1) fire rating and be non-particle releasing.
3. The humidifier shall be powered by a 120 V (UL) or 230 V (CE) single phase 50/60 Hz power supply.
4. The humidifier is designed to optimize the airflow across its surface area and allow evaporation of the desired quantity of water, with no carry-over of water droplets into the airstream.
5. The rate of evaporation shall be dictated by the air volume and temperature, humidifier physical dimensions and the media depth. The depth of media used shall govern the efficiency of the system up to 95 %.
6. The construction of this humidifier will allow for an optional droplet separator to be fitted to ensure no droplet carryover up to a maximum media free area velocity of 4.5 m/s (886 fpm).
7. The humidifier shall be evaporative adiabatic type and consequently incorporate a free cooling effect following the wet bulb line on the psychrometric chart.
8. All evaporative module metalwork shall be 1.4301 (304) stainless steel that includes a water distribution system to ensure uniform delivery of the water across the evaporative surface.
9. The evaporative humidifier includes a compact self contained hydraulic unit that incorporates up to 3 pumps.
10. The humidifier overflow is integrated into the hydraulic unit for simple installation.
11. A maximum of 3 stage control is available as standard, which can control up to 3 electronically commutated 24 VDC pumps.
12. The control unit provides fully automatic control of the humidification system.
13. Where necessary the control unit may be located up to 5 meters (16.4 ft) away from the evaporative module. It shall be pre-wired with 5 meters (16.4 ft) of cable.
14. The control unit shall be capable of accepting the following methods of humidity control:
 - Humidistat/thermostat or volt-free contact.
 - Remote enable
 - Supported control signals: 0-10 V, 2-10 V, 4-20 mA
15. The control unit will initiate and control water quality dependent cleaning cycles to control the build up of concentrates in the Module Tank.
16. The control unit must initiate timed drain down of the module tank at least once every 24 hours of inactivity to prevent stagnation. In the event of no demand for humidity, the tank will drain and remain empty.
17. Systems 900 mm (35.4") or wider can be supplied with a submerged UV water treatment system that kills micro-organisms in the reservoir. The use of such systems will increase power consumption (<80 W per lamp).
18. The humidifier is designed to be fully evaporative so that there is no aerosol carry over, which might carry microbes.

19. The humidifier shall be commissioned by a service engineer, approved supplier, or other suitably trained individual.
20. Modbus connectivity included as standard for monitoring the MC system.

4.2 Functional description Condair MC

4.2.1 Description

The water tank is filled up to a preset upper level via the level-controlled normally closed (NC) inlet solenoid valve. When the water level in the water tank drops below a certain limit, the level-controlled inlet solenoid valve opens until the upper limit is reached again.

The Condair MC provides On/Off or stage control by means of the Condair MC control unit and the stage pumps. The Condair MC control unit processes analog sensor/control signals and uses them to control the stage pumps.

In case of a humidification/cooling request with activated On/Off control the inlet solenoid valve (NC) opens and all stage pumps start and the water flows to the distribution header above the evaporative cassettes.

In case of a humidification/cooling request with activated stage control the inlet solenoid valve (NC) opens, then up to three stage pumps start (depending on the demand signal and evaporative module size) and the water flows to the distribution headers above the evaporative cassettes.

The distribution pipes inside the distribution headers evenly supply the water to the entire surface of the evaporative cassettes where it flows down and humidifies the air flowing through the evaporative cassettes. The excess water not used for humidification flows to the water tank.

To prevent accumulation of mineral residues and the formation of germs in the water tank, the tank is completely drained periodically.

If the inlet has not been opened for a prolonged time, the system will run a purge to drain of the supply line to ensure only fresh water is circulated.

4.2.2 Evaporative Media types

The Condair MC evaporative cassettes are available in two different humidification efficiencies:

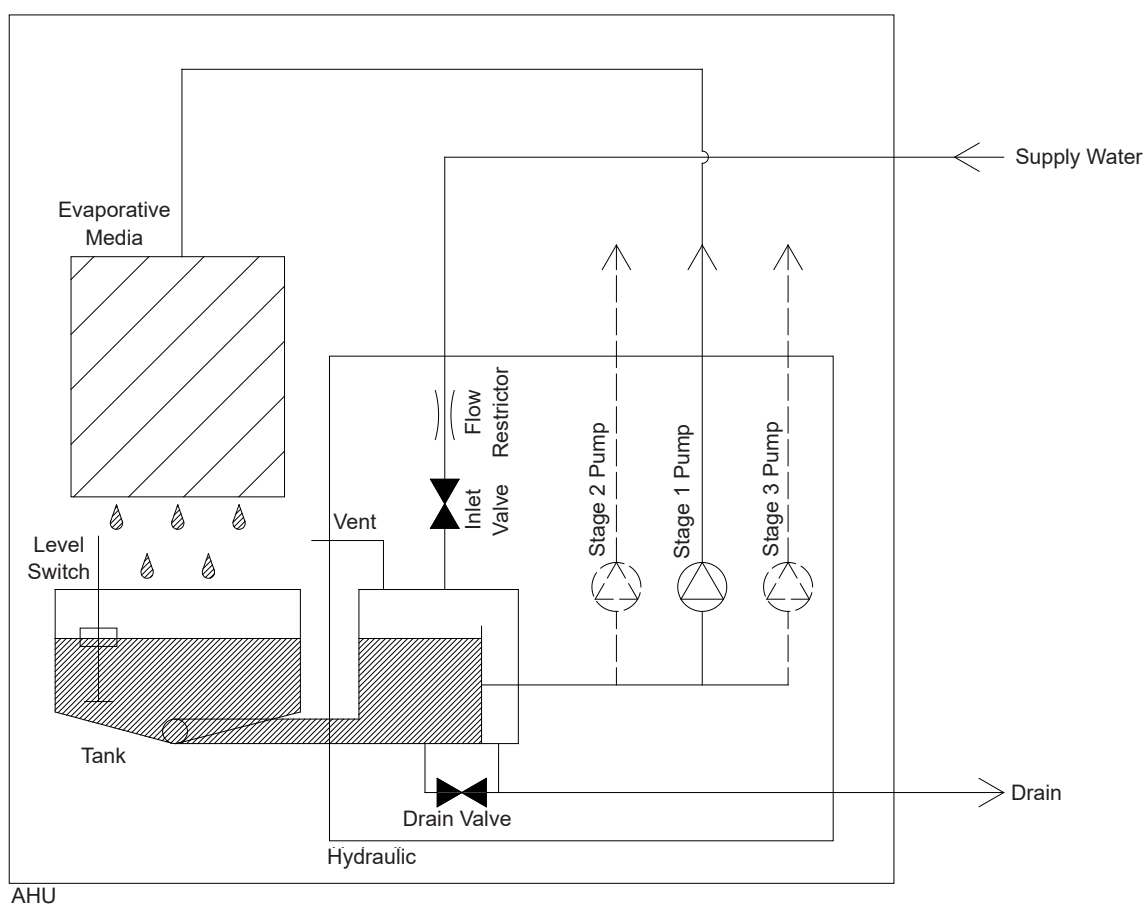
Material	Type	Cassette Depth	Maximum Humidification Efficiency
Glass fibre	F85	150 mm (5.9")	85 %
	F95	200 mm (7.9")	95 %

Droplet Separator

The droplet separator cassettes must be used if the media free area velocity is high ($> 3.5 \text{ m/s}$ / 689 fpm) in order to prevent water droplets being carried away in the air stream. Droplet separators allow the operation of the Condair MC with a maximum media free area velocity of 4.5 m/s / 886 fpm.

Your local Condair distributor can advise on selecting the most appropriate efficiency media for your application, and whether droplet separators are required.

4.2.3 Schematic flow diagram Condair MC

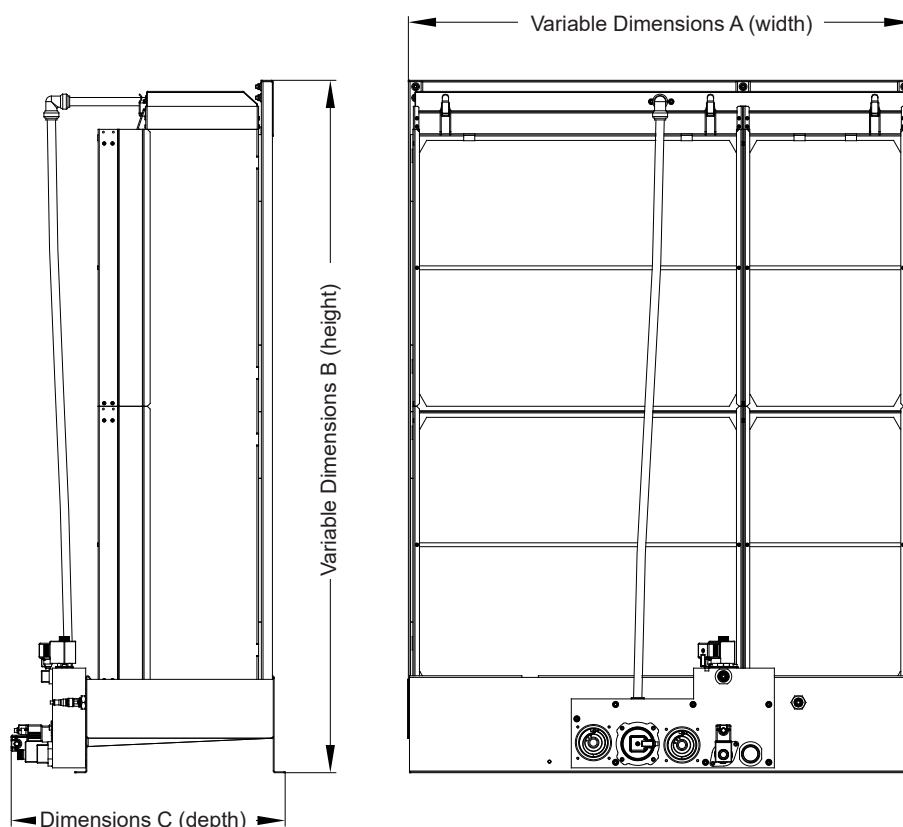


5 Installation

5.1 Product designation / Which model do you have

The product designation and the most important unit data are found on the rating plate fixed to the evaporative module and the control unit.

Dimensions evaporative module Condair MC



Dimension A (width)

Min: 600 mm (~24")
 Max: 3000 mm (~119")
 Increment: 300 mm (~12")

Dimension B (height)

Min: 750 mm (~30")
 Max: 3000 mm (~119")
 Increment: 250 mm (~10")

Dimension C (depth):

F85 fibre cassettes: 445 mm (~18")
 F95 fibre cassettes: 495 mm (~20")

Operating parameter	Range
Minimum continuous operating air temperature	10 °C (50 °F)
Maximum continuous operating air temperature	60 °C (140 °F)
Maximum feed water temperature	20 °C (68 °F)
Maximum media free area velocity	3.5 m/s (689 fpm)
Maximum velocity (with droplet separator)	4.5 m/s (886 fpm)
Admissible water supply pressure	2...5 bar (29...72.5 psi)
Water quality	(see chapter 5.3.2 Inlet water quality requirements)
Electrical Supply	120 V (UL) / 1~ / 50/60 Hz or 230 V (CE) / 1~ / 50/60 Hz
Power consumption	<145 W (3 stages, no options fitted)

Evaporative module product key

Example:

MC-0900-1250-F95-1-CE-DS

Product identification						
MC (media evaporator)						
Width evaporative module in mm						
Height evaporative module in mm						
Material type and efficiency evaporative cassettes:						
F85= F-Type Glass fibre 85 %						
F95= F-Type Glass fibre 95 %						
Number of pump stages						
Standard Applied:						
CE (CE Certification), UL (UL 998 Certification), UK (UKCA Certification)						
Droplet separator (if selected)						

5.2 Installation overview

5.2.1 Installation Health & Safety notes



WARNING!

A full risk assessment must be completed by suitably trained personnel prior to installing the ME unit. There may be increased risk when installing systems that necessitate working at height. The following risks should be considered (this list is not exhaustive, and there may be additional site specific risks that will need to be considered):

- Electrical work
- Manual handling
- Musculoskeletal disorders
- Working at height
- Falling objects & objects dropped from higher levels
- Risks arising from the use of Mobile Elevated Work Platforms
- Risk of contact with ceilings, overhead items or asbestos roofing while using access equipment
- Adverse weather conditions
- Unsuitable surface and ground
- Other equipment, machinery or supply pipe work in the vicinity of the work area

Installation of the ME unit must only be carried out by trained personnel, and all installation equipment must be checked by a skilled and competent health & safety representative.

5.2.2 Installation Condair MC

1. Mounting the evaporative module → see [chapter 5.3](#)
2. Mounting the hydraulic module → see [chapter 5.4](#)
3. Water installation → see [chapter 5.5](#)
4. Mounting the control unit → see [chapter 5.6](#)
5. Electrical installation → see [chapter 5.7](#)

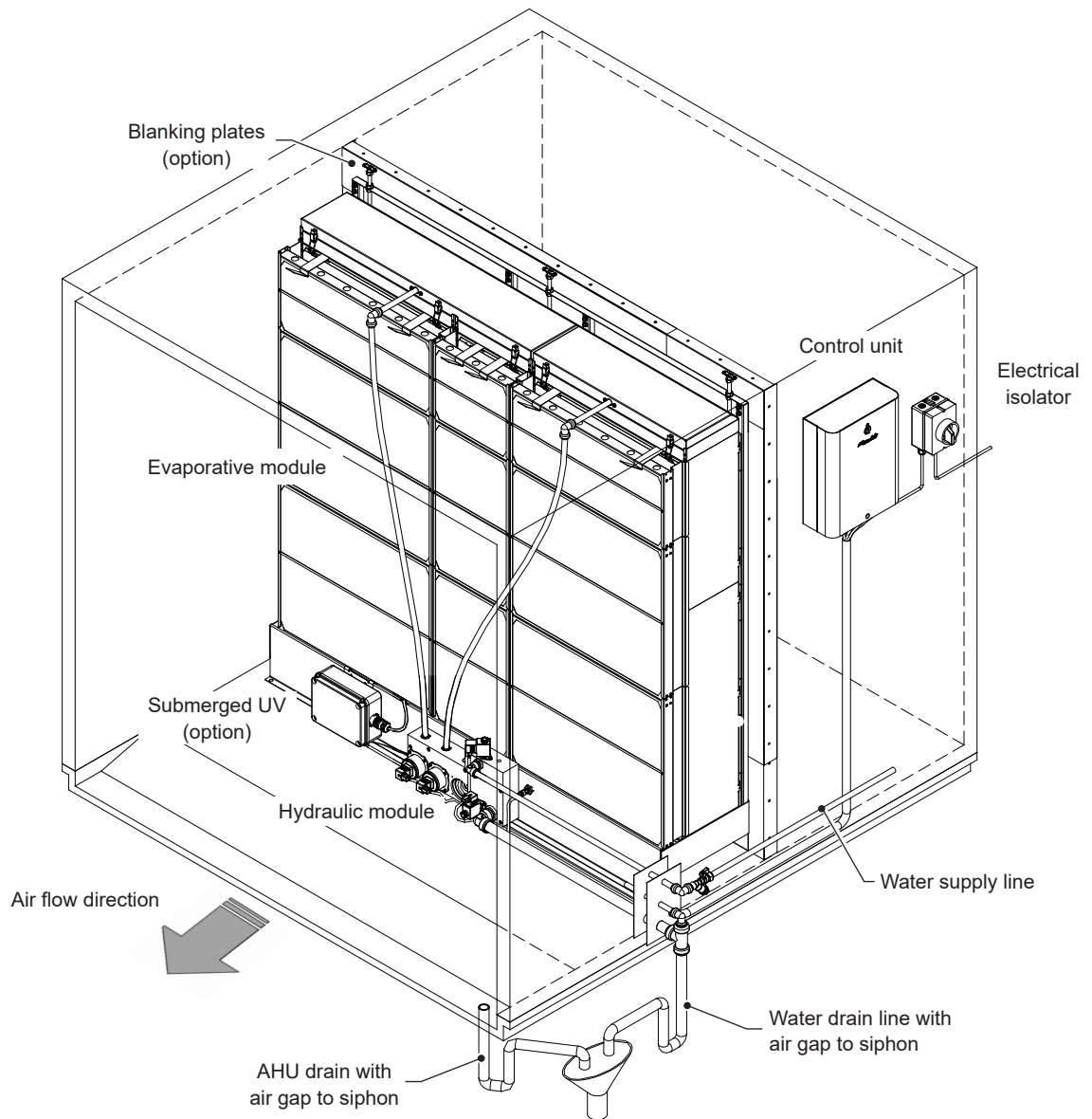


Fig. 1: Installation Condair MC

5.3 Mounting the evaporative module

5.3.1 Notes on positioning the evaporative module

The design and dimensioning of the AHU/air duct as well as the location of the evaporative module inside the duct are determined, recorded and set when planning the entire system. Prior to installation, however, make sure the following criteria have been taken into consideration:

- The AHU/air duct floor must be designed with a loading capacity capable of supporting the evaporative module's weight.
- In the area where the evaporative module is installed the floor of the AHU/air duct must offer a plane support (lengthwise and crosswise).
- The evaporative module must be installed in a **waterproof** section of the AHU/air duct.
- Downstream, directly after the evaporative module a **drain pan with provision for running water to waste** must be installed. The drain must be connected via a drain trap to the waste water line of the building. The drain trap must be sufficiently high and must be filled with water prior to commissioning, so that the drain trap is not emptied by the air pressure in the duct. The drain pan and the drain trap must be accessible for cleaning and disinfection as part of the periodic maintenance of the system.
- For installation and maintenance sufficiently large access doors before and after the evaporative module must be available in the AHU/air duct.
- The supply air must be filtered. We recommend to install an **ISO ePM1 ≥ 50 % air filter or equivalent (MERV 13)** before the evaporative module. If no air filter or an air filter with lower quality is installed an increased maintenance will result.
- An **even air flow over the full cross section** of the evaporative module must be guaranteed. If necessary, rectifiers or perforated plates must be installed.
- The evaporative module must be positioned to allow installation of a drain pipe with a constant downslope through the side wall of the AHU/air duct.
- In case of low ambient temperature the AHU/air duct must be insulated to prevent the moist air from condensing inside the duct.
- If the AHU is equipped with a heater, make sure it is at least 600 mm (23.6") away from the evaporative module.
- If the evaporative module includes the optional droplet separator cassettes for high air velocities, then the droplet separator cassettes must be installed.
- For commissioning and maintenance we recommend a **minimum** of 600 mm (23.6") of free space after the evaporative module.
- For inspection we recommend 600 mm (23.6") of free space before the evaporative module. If inspection access is not required before the module, a minimum clearance of 200 mm (7.9") is acceptable provided any heater is at least 600 mm (23.6") away from the evaporative module.



WARNING!

Consideration should be given to the amount of space required after the evaporative module for access equipment, particularly for taller systems as personnel will require safe access to the top of the evaporative module.

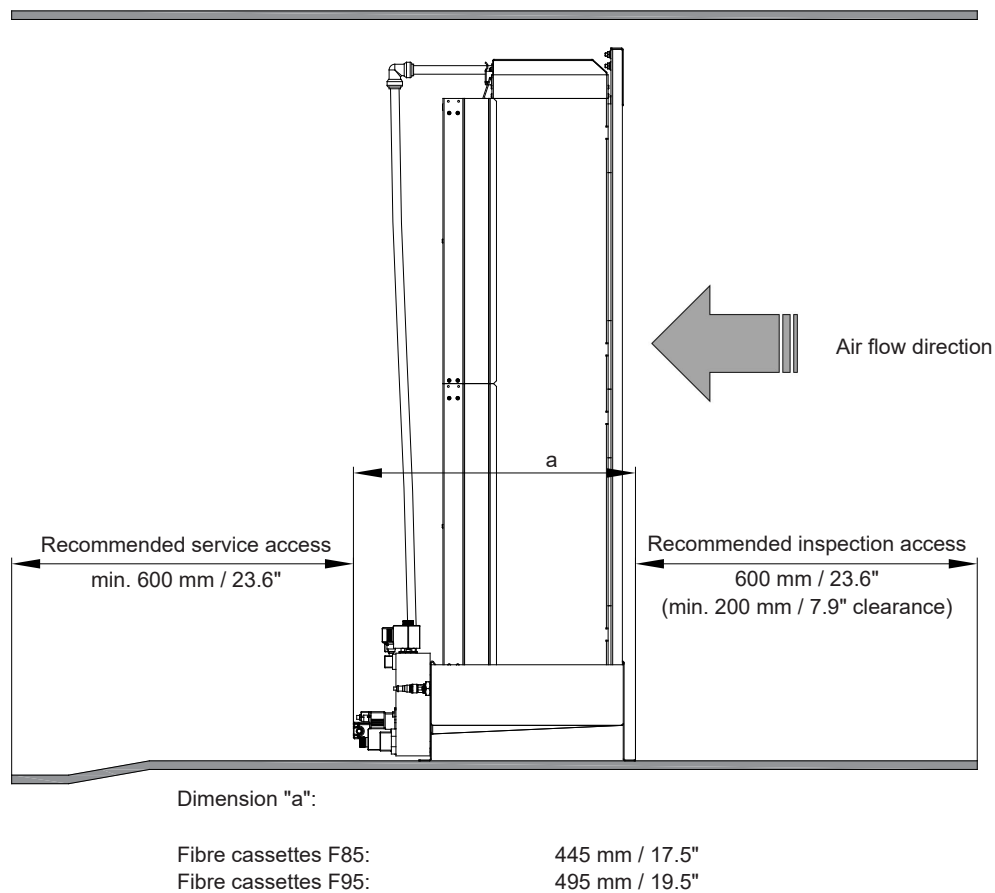


Fig. 2: Positioning of the evaporative module (blanking/fixing not shown)

The following side and top clearances must be observed, when positioning the unit.

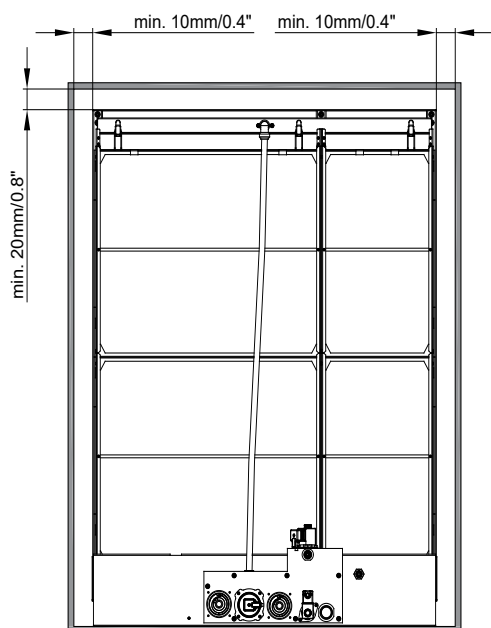
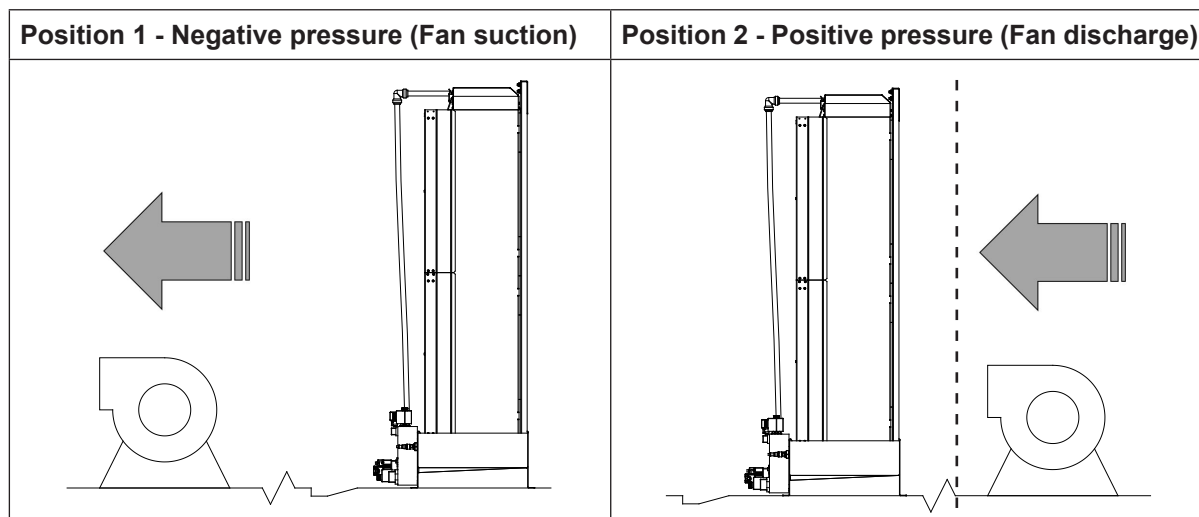


Fig. 3: Evaporative module

If possible, the evaporative module should be positioned on the negative pressure, i.e. suction side of the fan (position 1 in the diagram below).

The maximum media free area velocity is 3.5 m/s / 689 fpm (4.5 m/s / 886 fpm with droplet separator), for both installation positions.

Note: Laminar air flow must be provided for system efficiency and to avoid droplet carryover!



CAUTION!

The MC evaporative module contains a large reservoir of water when in operation. Install the ME unit where is no risk of water damage, and make provisions to contain any leakage.

5.3.2 Inlet water quality requirements

Condair recommends that the Condair MC is connected to a clean, wholesome (drinking water quality) mains water supply. For areas of hard water and to minimise scale build up the water supply may be treated by a reverse osmosis system (RO).

Reverse osmosis

For Condair MC systems supplied with RO water it is recommended that the system is operated with a supply water conductivity of **> 30 $\mu\text{S cm}^{-1}$ at 20 °C (68 °F)**. The use of RO water fed tanks and reservoirs is only permitted as part of a managed and hygiene monitored water system and should form part of the water system risk assessment.

Other water supplies:

There is a growing demand to utilise sustainable water sources to help overcome scarcity challenges and recycle water. It is possible to use high-quality, treated effluent for non-wholesome applications. The following gives guidance on reclaimed water quality that may be acceptable for use within the Condair MC.

"Effluent treated water" must be treated by an appropriate water treatment method and risk assessed to ensure it is safe and suitable for use in the Condair MC unit. It is the responsibility of the user to ensure that the water supply system is part of a managed, hygiene monitored water system, risk assessed and complies with the local regulations and bylaws.

Below are example water conditions that would allow a Condair MC to operate within specification.

Parameter	Content in supply water	Concern
Temperature	< 20 °C (68 °F)	Warm water favours growth of bacteria
Aluminium	–	No sp. concerns / Prone to corrosion with RO water
Ammonium	< 0.50 mg/l	Odor passed to air
Calcium	< 300 mg/l	Scale formation
Chloride	< 300 mg/l	Corrosion of stainless steel
Color	None	Not directly a concern
Copper	< 1 mg/l	Deposits and corrosion stimulation
Conductivity	< 650 $\mu\text{S cm}^{-1}$ at 20 °C (68 °F)	Total hardness and scale formation.
pH	6 to 8	Acid or Alkali damage to equipment.
Iron	< 0.5 mg/l	Deposit formation on oxidation and a critical support role in Legionella growth.
Manganese	< 0.1 mg/l	Deposit formation
Nitrate	–	No specific concerns
Nitrite	–	No specific concerns
Odor	Acceptable to users	Smell passed to air
Sulphate	< 250 mg/l	No specific comments
Sodium	–	No specific concerns
Total organic carbon	–	No specific concerns
Turbidity	< 5 NTU	No specific concerns
Colony count 22 °C	< 1000 cfu/ml	Indicator of contaminated water supply
Coliform bacteria	< 10 cfu/100 ml	Indicator of poor water quality
Legionella bacteria	< 50 cfu/1000 ml	Risk of Legionella
Pseudomonas species	< 10 cfu/100 ml	Indicator of slime forming potential



DANGER!

Failure to ensure the quality of the supply water may endanger the health of individuals exposed to the MC system, the air from the AHU/air duct, or the water from the MC system. Poor supply water quality may also encourage the growth of micro-organisms (including the bacterium which causes Legionnaire's disease).

Controlled Substances



DANGER!

Many of the following controlled substances could present a risk to health; for example vinyl chloride is highly toxic, flammable and carcinogenic and could be evaporated off the evaporative media from contaminated water and passed to the airflow. Therefore it is important to note that any supply water coming from complex waste water which may contain the following contaminants should be carefully risk assessed by a water treatment specialist.

- | | |
|--|---|
| – Clostridium perfringens (including spores) | – Epichlorohydrin |
| – Acrylamide | – Fluoride |
| – Antimony | – Lead |
| – Arsenic | – Mercury |
| – Benzene | – Nickel |
| – Benzo(a)pyrene | – Pesticides |
| – Boron | – Polycyclic aromatic hydrocarbons |
| – Bromate | – Selenium |
| – Cadmium | – Tetrachloroethene and Trichloroethene |
| – Chromium | – Trihalomethanes |
| – Cyanide | – Vinyl chloride |
| – 1,2-dichloroethane | |

Water Monitoring

The Condair MC water system must be monitored for hygiene as part of the maintenance programme, this should be based on a risk assessment & in accordance with local regulations.

Disinfection Chemical

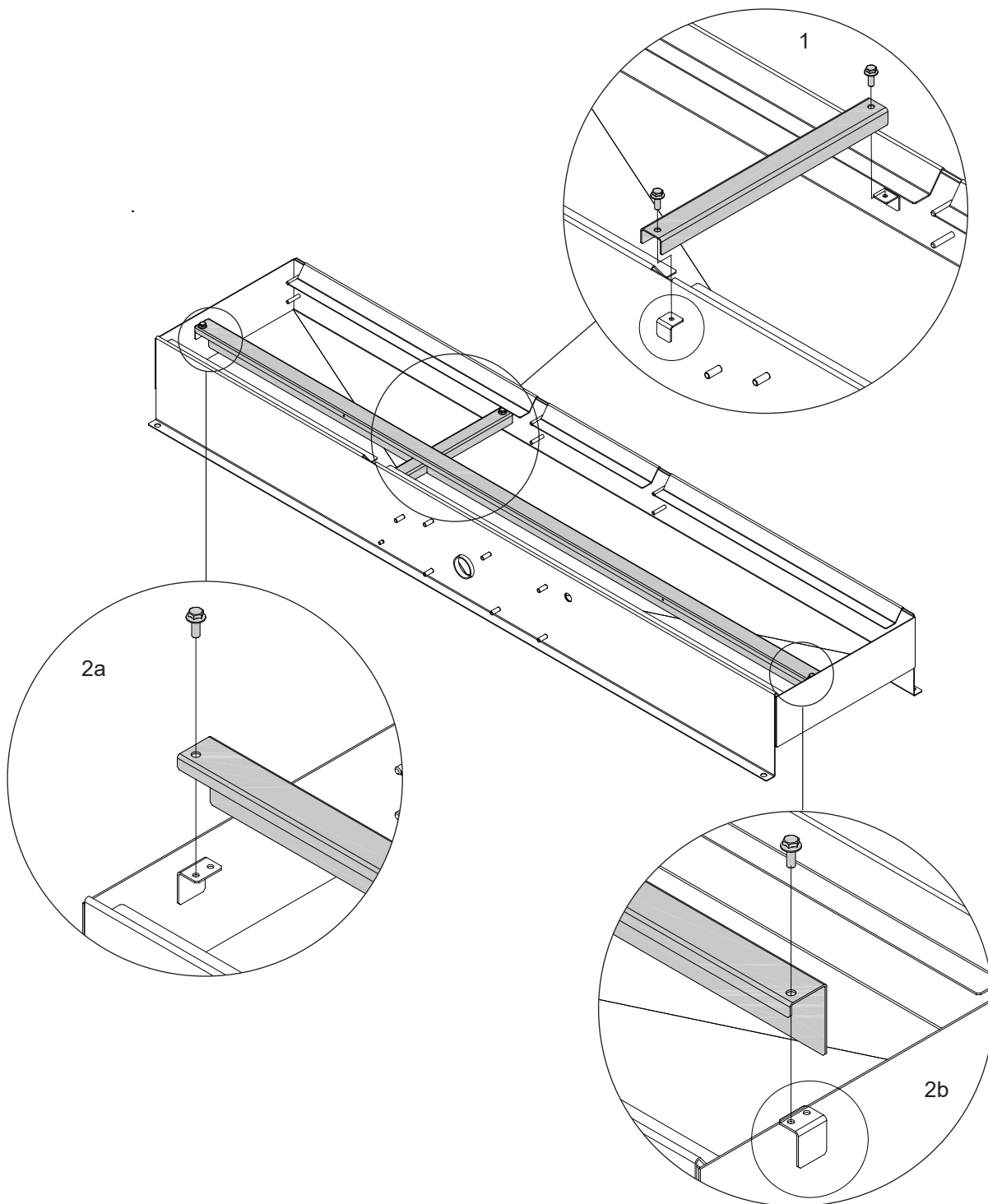
Depending on the system hygiene, it is advised that preventative disinfection chemical should be added to the Condair MC water tank at an appropriate frequency, such as a monthly basis.

Any chemical used must be allowed as per local water regulations at the site of install and be of mild concentration. Condair recommends the use of a Hydrogen Peroxide (H₂O₂) based product with a concentration of 5-7.5 % (e.g. Sanosil S010).

5.3.3 Installation procedure evaporative module

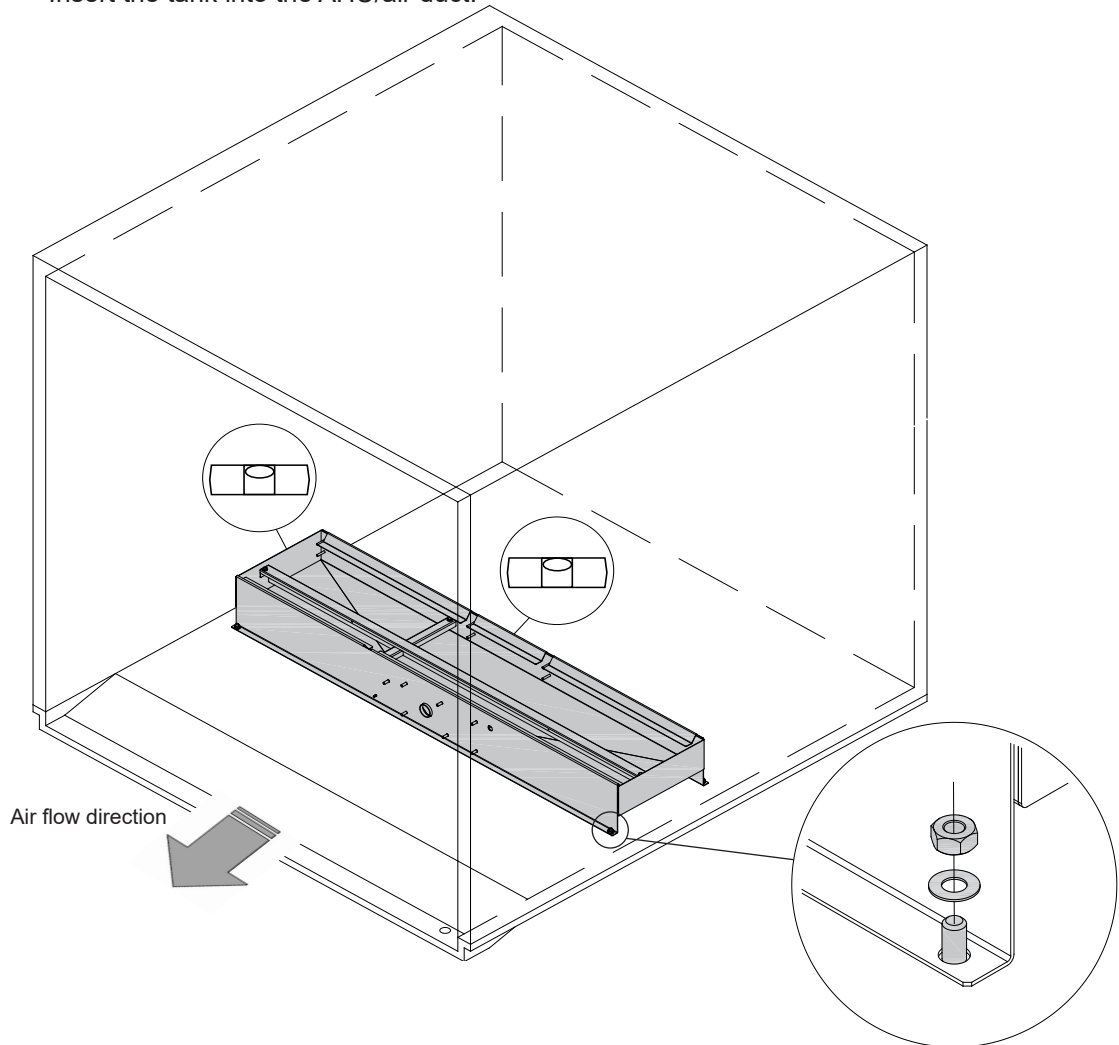
1. Check tank and framework parts:

Ensure tank cross member and any required supports are installed and fixed into the tank assembly using M6 x 16 mm Hex screws.



2. Mount tank in AHU

Insert the tank into the AHU/air duct.



WARNING!

Use an appropriate lifting device or handle the tank with the help of another person to position it inside the duct. It is the customer's responsibility to ensure that operators are trained in handling heavy goods and to enforce the relevant lifting regulations.

- Align the tank to the centre of the duct and perpendicular to the duct walls. When aligned fix tank to the duct floor or levelled framework at the fixing holes in the base.
- Method shown is typical install example.



CAUTION!

The installer must take appropriate measures to ensure that the duct floor remains water proof once the tank upstands has been fixed to the duct floor.

Check that the tank is lengthwise and crosswise exactly horizontal using a level.

3. Fix frame to the tank:

- Fix the vertical supports to the tank using the flange nuts (M6). Then, align the vertical supports exactly vertical using a level and tighten the nuts.
- Fix the cross member to the vertical supports using the flange nuts (M6). Then, tighten the nuts.

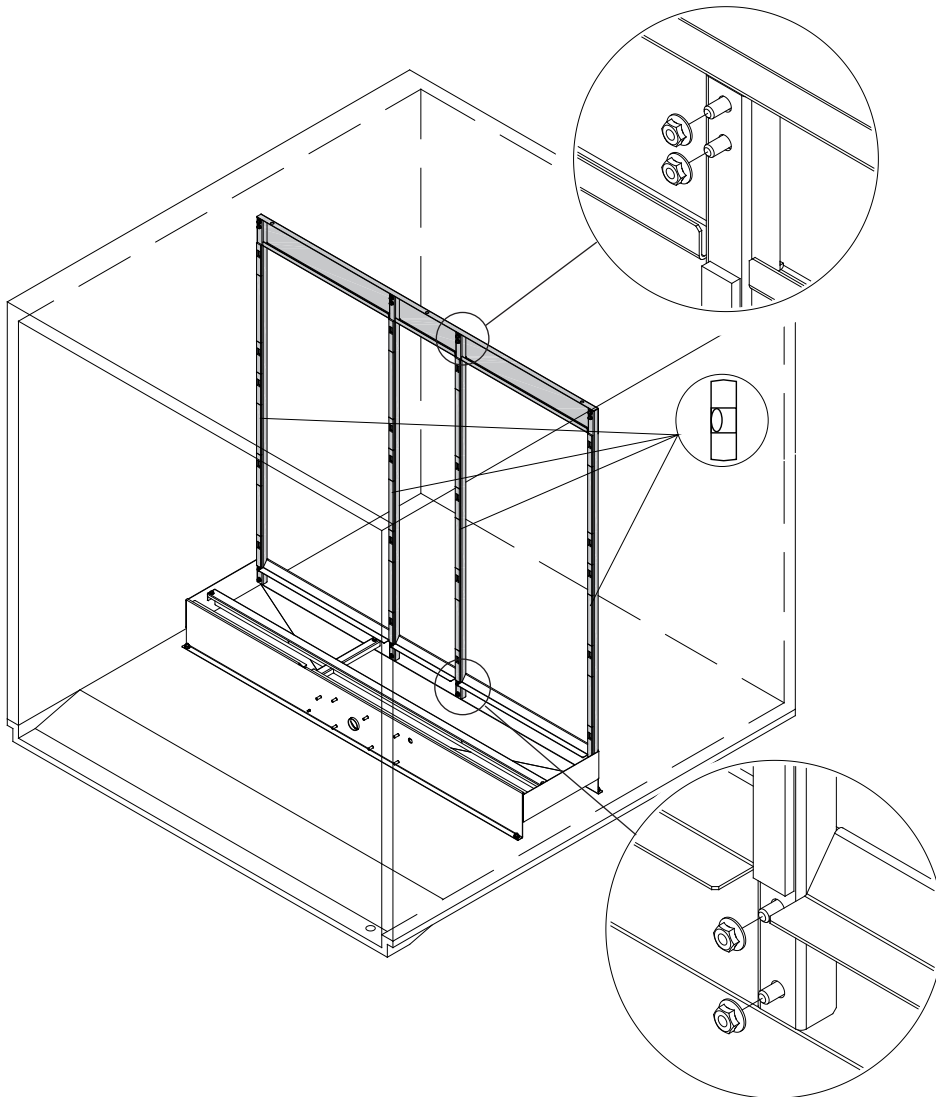


Fig. 4: Fixing frame to tank

4. Fix cross member of frame to AHU/duct ceiling:

Fix the cross member to the AHU/duct ceiling using appropriate fixings (supplied as part of the installation kit). Before tightening the screws (not supplied) align the vertical supports exactly vertical using a level.



WARNING!

If the cross member is not secured to the AHU/duct ceiling there is a risk that the evaporative module could fall over, potentially causing injury or damage.

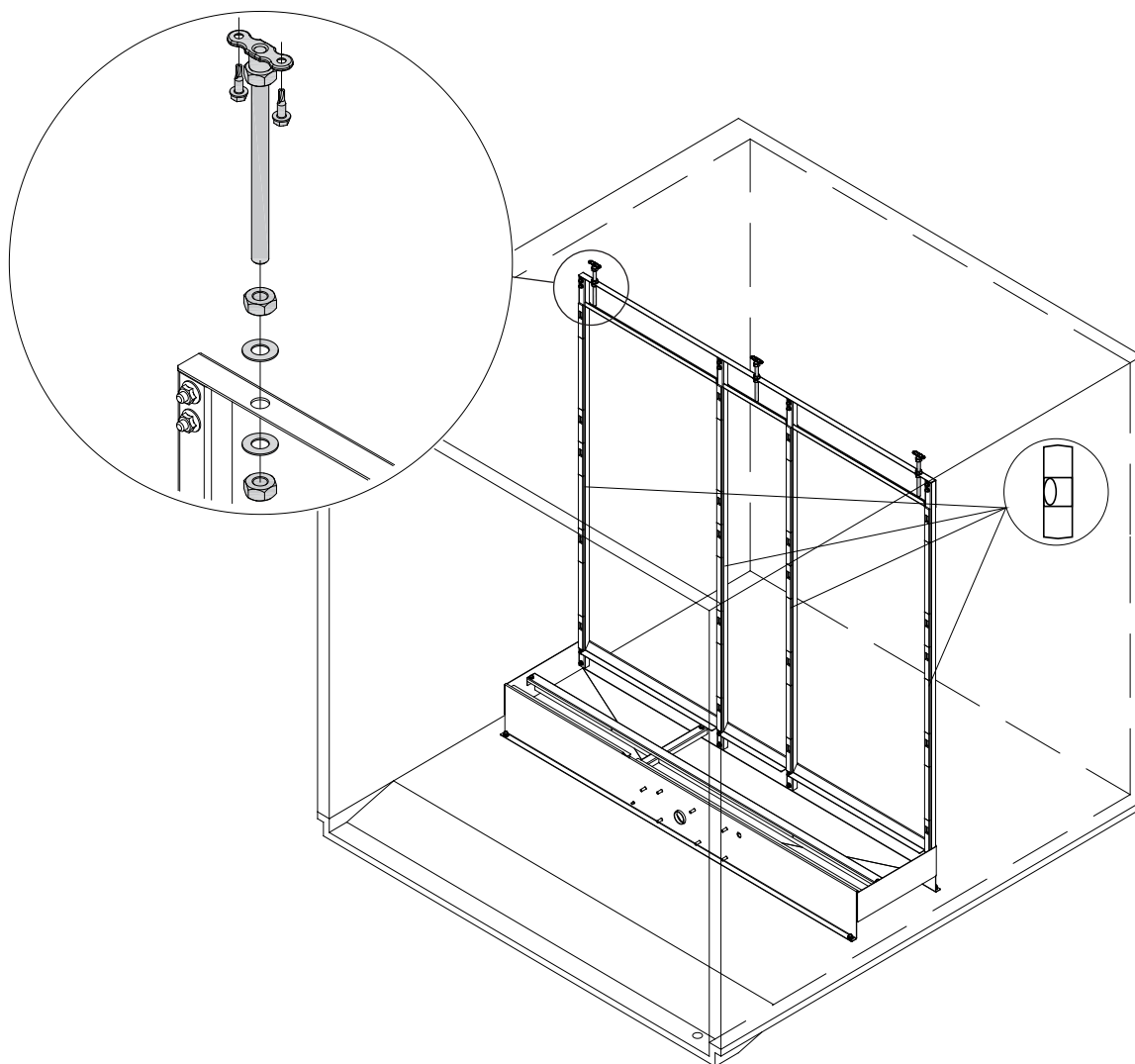


Fig. 5: Fix cross member to AHU/duct ceiling

5. Mount blanking plates on the air inlet side (Condair blanking plates available as option):

- Starting on each duct side at the bottom fix the side blanking plates to the duct wall using appropriate fixings. Before fixing make sure the side blanking plates are aligned exactly vertical and the free end of the blanking plates touches the side of the corresponding vertical support.
- Starting on one side fix the upper blanking plates to the duct ceiling using appropriate fixings. Before fixing make sure the upper blanking plates are aligned exactly perpendicular to the duct walls and the free ends of the blanking plates touch the cross member of the frame. Also ensure the ends of the blanking plates are touching the side blanking plates.



CAUTION!

The installer must take appropriate measures to ensure that the duct floor remains water proof where lower blanking plates have been fixed to the duct floor.

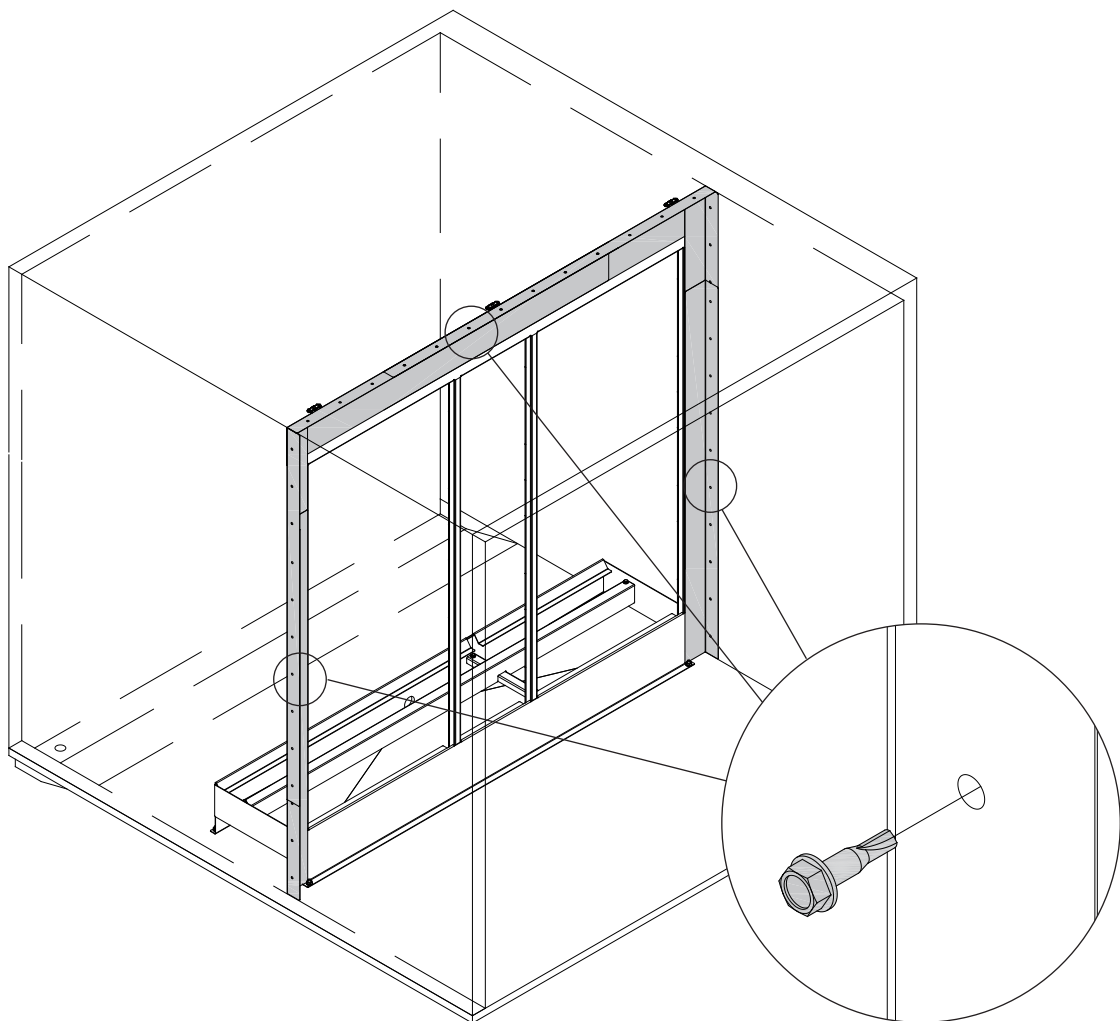


Fig. 6: Mounting the optional Condair blanking plates on the air inlet side

6. Fit float level switch:

- Fit the rubber washer over the threaded end of the float switch and insert from the inside of the tank through the locating hole on the tank.
- Carefully tighten the plastic nut onto the threaded end of the float switch from the outside of the tank. Check alignment to ensure the float can drop to its lowest point and tighten the nut fully so that the switch cannot rotate

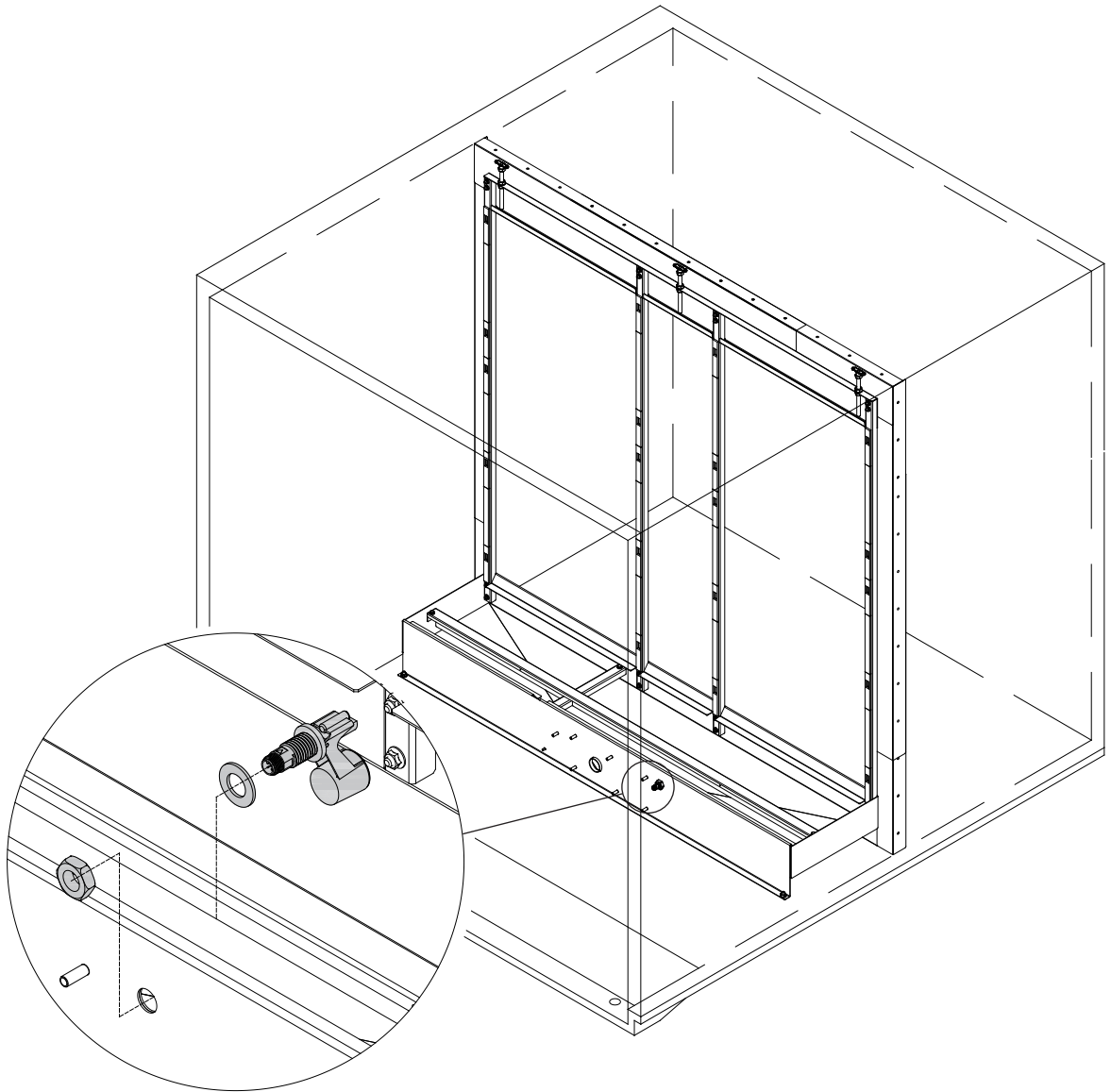


Fig. 7: Fitting the float level switch to the tank

7. Mount optional submerged UV, if applicable:

If your system is equipped with the optional submerged UV system:

1. Mount two of the provided clips to each UV lamp and locate the assemblies in the tank as shown so that they are positioned underneath the tank cross member and support beam(s) where the media cassettes rest.
2. Secure the clips to the threaded holes in the tank cross member using the plastic M4 thumb screws.
3. Hook the power distribution box (CE version pictured) onto the rear face of the tank as shown, it should be located near the earth stud and cutout space in the separator cassette supporting lip where the lamp cable will be routed.
4. If required, fit an earth bond wire from the earth terminals inside the junction box, through the cable gland, to the earth stud on the rear face of the tank. An earth bond connection is mandatory for UL systems.
5. Connect the lamp plug(s) to the junction box socket(s) and secure any free cable, ensure the cable(s) can pass through the cutout space in the separator cassette supporting lip.

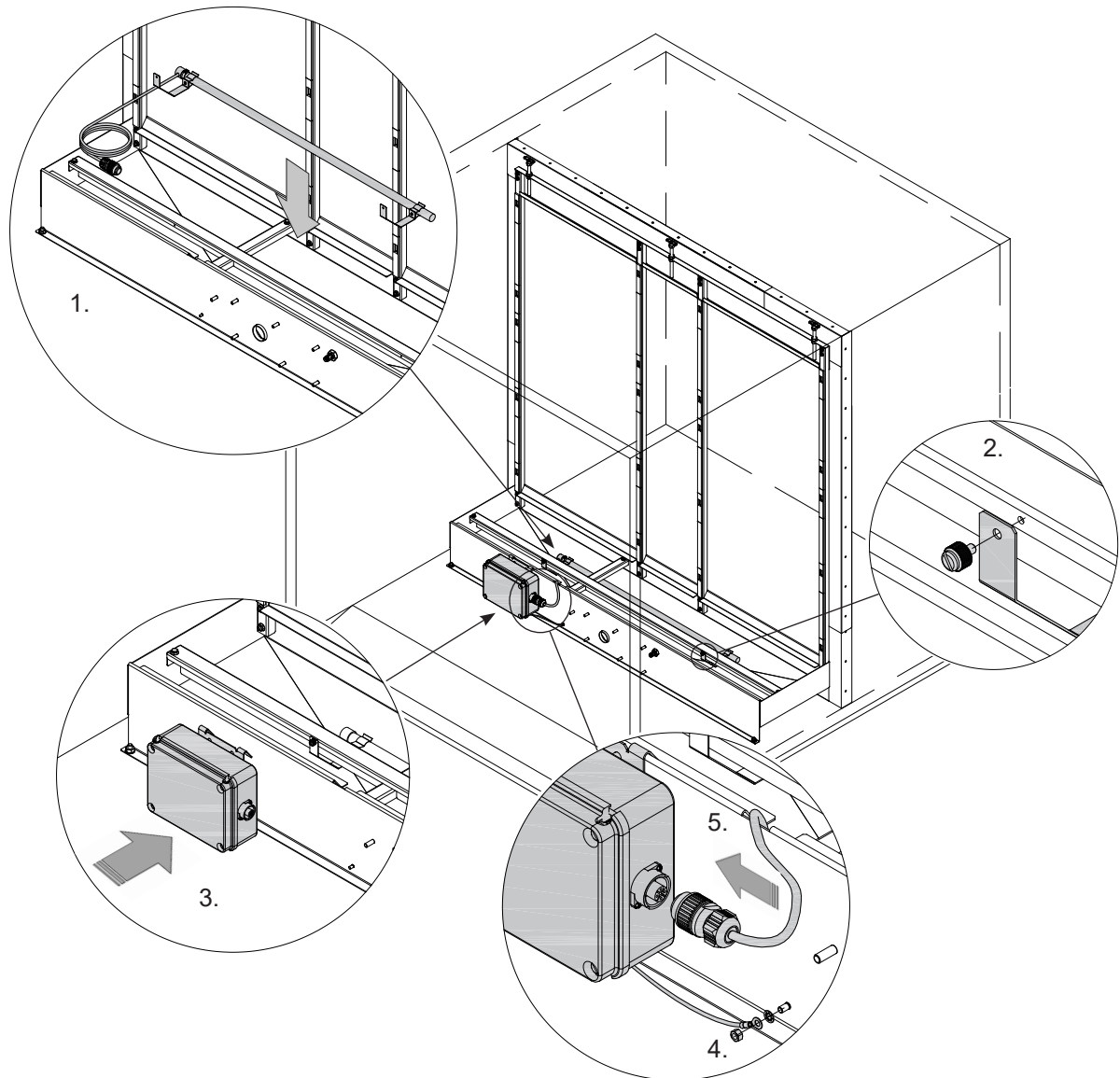


Fig. 6: Mounting the optional submerged UV

8. Mount evaporative cassettes:

Note: to avoid damage to the evaporative cassettes during transit, we recommend that the evaporative cassettes are fitted on site.

- Before installing the evaporative cassettes sweep the interior of the tank.
- Starting with the tallest evaporative cassettes on the bottom and working up to the shortest evaporative cassette on the top, hook the cassettes into the vertical supports. Make sure the overlying cassettes slip properly into each other.

Note: The width of the cassettes at each position must match the distance between adjacent vertical supports, all hooks at each side of the cassette must be located into the slots of the vertical supports.

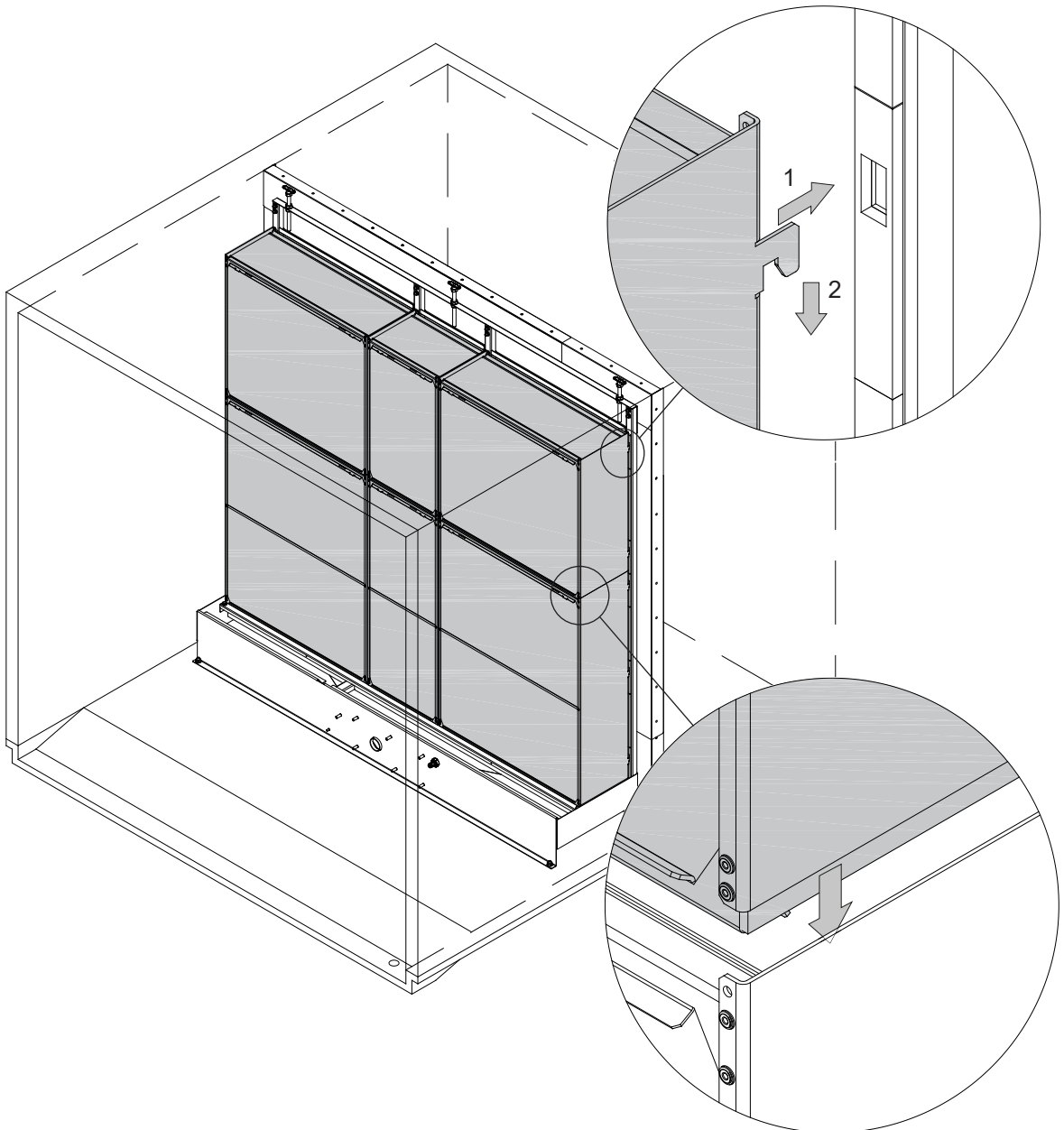


Fig. 7: Mounting the evaporative cassette

9. Mount distribution head assembly to the topmost evaporative cassettes:

Note: The topmost evaporative cassettes will be the ones that are shortest (vertically)

- Mount the appropriate distribution cassettes onto the corresponding evaporative cassettes, by hooking the return on the underside of the distribution cassette under the top strut of the evaporative cassette.
- Mount the appropriate distribution heads onto the corresponding evaporative cassettes or distribution cassettes respectively, by hooking the return on the underside of the distribution head under the top strut of the cassette below. Then secure the distribution heads to the evaporative cassettes using the locking clamps on the distribution heads.

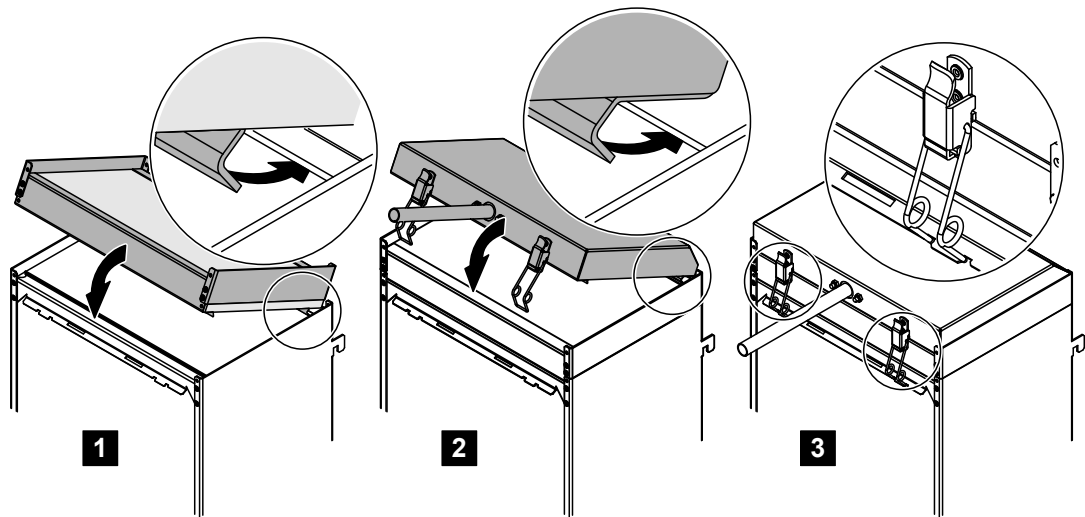
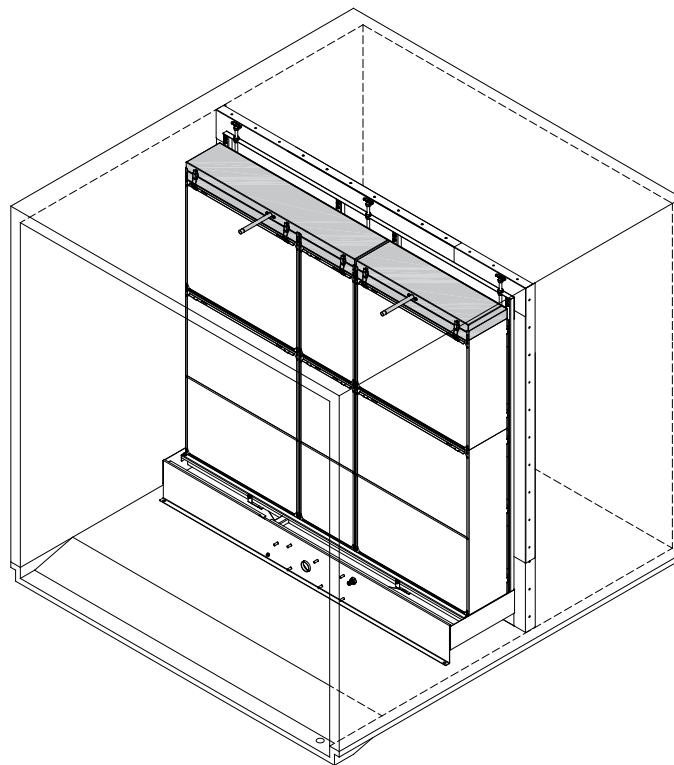


Fig. 8: Mounting the distribution head assembly onto glass fibre evaporative cassettes

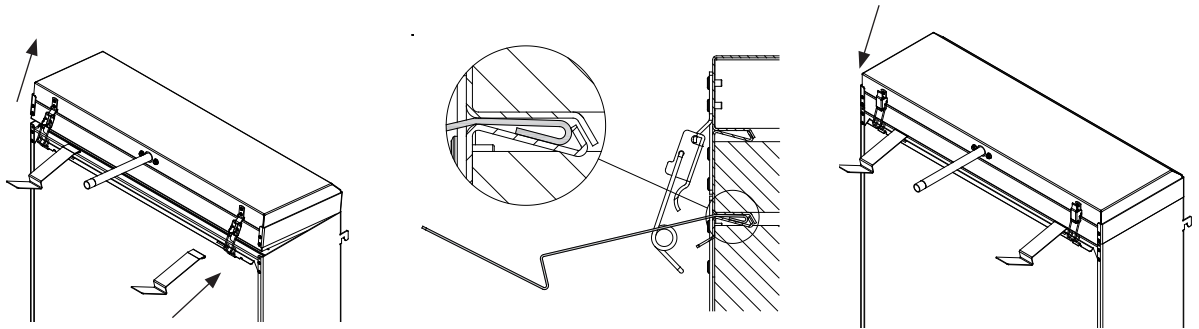


10. Mount the droplet separator cassettes (this step must only be carried out, if your system is equipped with a droplet separator):

Note: to avoid damage to the droplet separator cassettes during transit, the droplet separator cassettes must be fitted on site.

Fit the clips to the top of each bank of media cassettes:

- Release the clips holding each distribution head assembly in place.
- Lift the distribution head and distribution cassette slightly and insert the hem-folded end of two separator brackets into the recess in the top strut of the uppermost media cassette, position each bracket above the slots in the cassette strut.
- Reseat the distribution cassette and header to grip the separator brackets in place and secure them using the distribution assembly clips.



Assemble the Separator Cassette Banks:

- Starting with the tallest droplet separator cassettes on the bottom, and working towards the shortest cassettes at the top, rivet the banks of the droplet separator cassettes together using a rivet gun with $\varnothing$ 3.2 mm (0.13") blind rivets. Make sure the overlying cassettes slip properly into the subjacent cassettes, and the height of each finished bank matches the height of the evaporative cassettes.

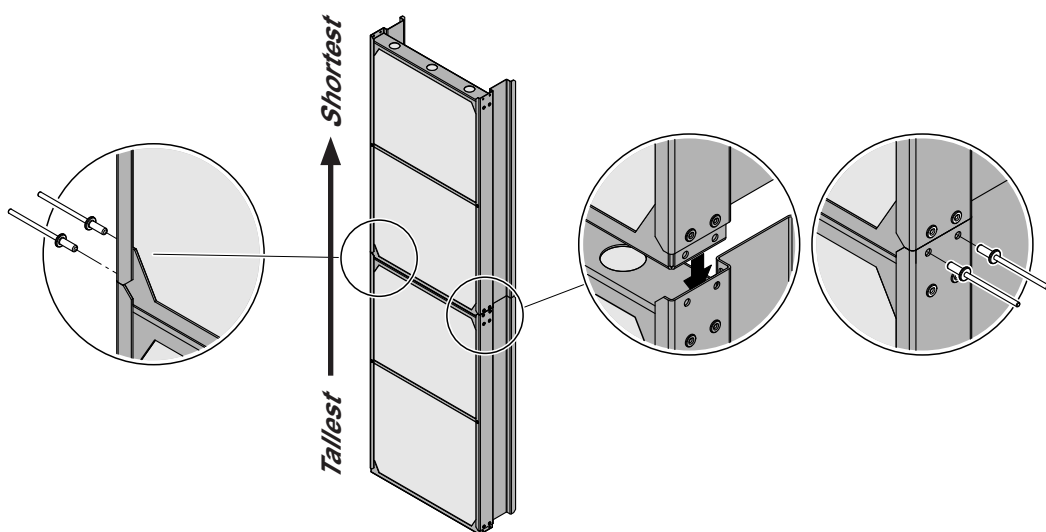


Fig. 9: Riveting the banks of the droplet separator cassettes together

- Starting on one side mount one separator bank after the other onto the supporting lip on the rear face of the tank. Align with the evaporative cassette metalwork and ensure the framework of the droplet separator fits around that of the evaporative cassettes. Push the top separator cassette under the separator brackets until they spring back down to secure the separator cassette bank firmly in place.

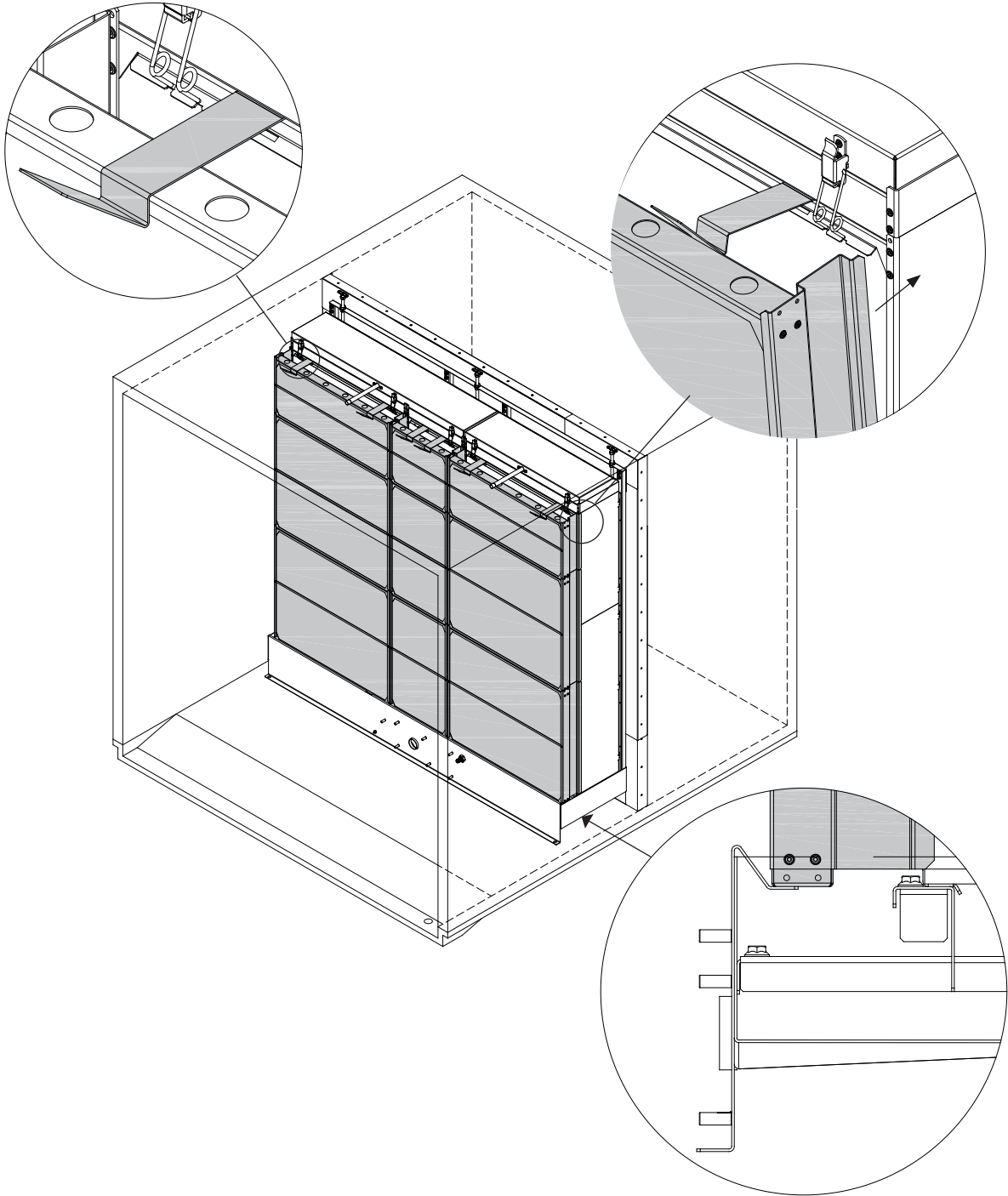


Fig. 10: Mount the droplet separator banks

5.4 Mounting the hydraulic module

1. Ensure the hydraulic gasket is seated securely in the rear of the hydraulic module.
2. Then, align the 7 mounting holes of the hydraulic module with the fixings on the face of the tank and press into position.
3. Fix the hydraulic module to the tank using the M5 x 50 mm screws and washers supplied. Tighten the screws carefully by half a turn at a time to ensure even compression of the gasket, until the hydraulic module touches the face of the tank.

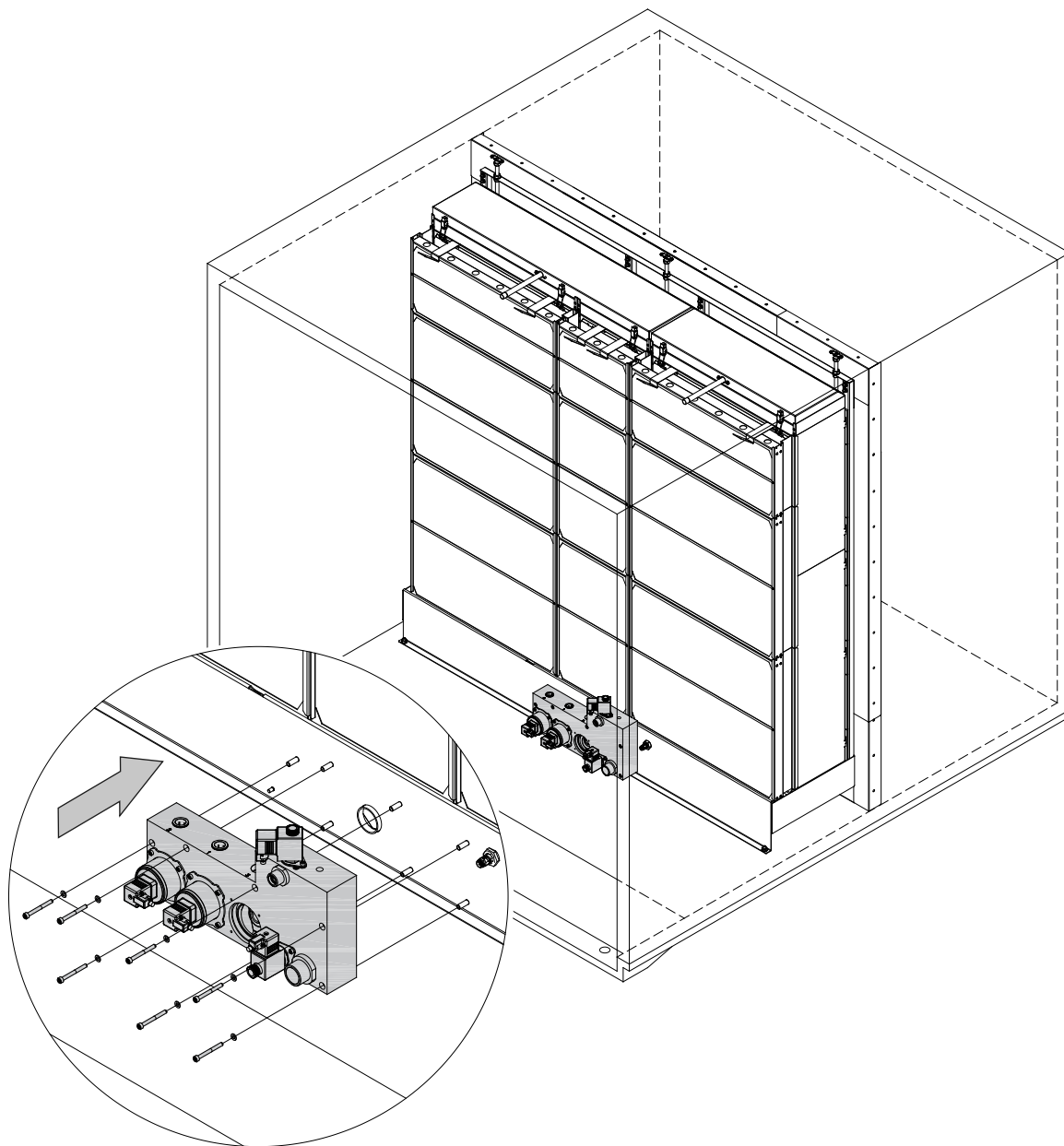


Fig. 11: Mounting the hydraulic module

If installing a UL certified system, a cover must be installed to the hydraulic module (supplied as part of UL specification). It is recommended this is fitted prior to connecting supply and drain pipework, please refer to [chapter 5.7.4.5](#) for instruction.

5.5 Water installation

5.5.1 Notes on water installation

The layout of the water piping (supply, drain and distribution piping) depends on the system version. Refer to the corresponding chapter for detailed information and observe the following installation notes.

Notes on water supply

- The water supply is to be carried out according to the figures found in [chapter 5.5.2](#) and the applicable local regulations for water installations. The indicated connection specifications must be observed. The installation material must be supplied by the customer.
- The installation of a **shut-off valve** (not supplied) in the supply line is mandatory and should be made as close as possible to the hydraulic module. Whilst an air gap has been designed inside the hydraulic module, it is recommended that a suitable check valve or backflow prevention device is also fitted to the supply line.
- The water supply must provide a minimum of 8 litres per minute at a pressure range of 2-5 bar (29-72.5 psi), a pressure regulator should be installed to control the pressure if there is a risk of the pressure exceeding this range.
- The installation material must be rated for the supply pressure and certified for use in drinking water supply systems.
- The 1/2" male threaded fitting that is connected to the water inlet port of the hydraulic module should not be subjected to torsional force. It is recommended that a flexible supply hose with 1/2" union connection is fitted between the supply pipe and the inlet fitting to ensure it will not be subjected to excessive vibration while the AHU is in operation, and allow for periodic replacement of the inlet flow restrictor.
- Regarding supply water quality see appendix.
- **Important! To prevent new systems being contaminated with low quality water the entire water supply line must be flushed and tested until the supply water and the bacteria counts, are in line with the water quality specifications, before connecting it to the hydraulic module.** For water quality requirements refer to [chapter 5.3.2](#).



CAUTION!

After cutting rigid pipes any **sharp edges must be deburred**, as sharp edges may damage the couplings and seals or cause injury.

Notes on water drain

- The 1" male threaded fitting that is connected to the drain outlet port of the hydraulic module should not be subjected to torsional force.
- The water drain is to be carried out according to the figures found in [chapter 5.5.2](#) and the applicable local regulations for water installations. The indicated connection specifications must be observed. The installation material must be supplied by the customer.
- Make sure the drain line is installed with a constant down-slope down to the tundish.
- The drain pipe must not touch the tundish, allow air gap of min. 25 mm (1").
- Make sure the drain pipe, the drain trap and the tundish are correctly fixed and easily accessible for inspections and cleaning purposes.
- Access hole for the drain pipe through the duct/AHU must be provided by the customer.

Important: after installation seal between drain pipe and AHU/duct wall using silicone-free sealant.

- The minimum inside diameter of the drain pipe must be maintained throughout the entire length!

Notes on distribution piping

- The distribution piping is to be carried out according to the figures found in [chapter 5.5.2](#) and the applicable local regulations for water installations. The indicated connection specifications and connection layout must be observed.
- The distribution piping is made of ø15 mm flexible plastic hoses.
- Make sure the distribution hoses have a constant downslope (no sagging) to the hydraulic module and are not kinked over the entire length.

General notes on installation of the hoses

- Use the supplied ø15 mm flexible plastic hoses only. For hygienic reasons do not use other hoses (except products supplied by your Condair distributor).
- When cutting hoses use an **appropriate cutting tool** providing **straight, kink-free** cuts.
- The hoses must be free of kinks and other damage (longitudinal scratches or misshaped ends, in particular).
- When cutting hoses **ensure at least 25 mm (1")** is added to the required length, to ensure the hoses can be fastened correctly (down to the stop) in the push-fit couplings.
- Make sure the hoses are not kinked and pay attention to the **minimum bend radius of 100 mm (3.9")**.
- Do not lead hoses past hot system components (**max. ambient temperature is 60 °C/140 °F**).
- After installation verify correct fastening of all hoses. Correctly mounted hoses can not be removed without pressing the locking ring.



CAUTION!

After cutting the hoses any **sharp edges must be deburred** otherwise the couplings may be damaged.



CAUTION!

In order to avoid damage caused by leaking water during operation, all hoses must be correctly secured against accidentally pulling out.

5.5.2 Water installation

Cassette Banks	Connection layout distribution hoses
1-2	1 or 2 Banks
3-4	2 Banks 1 or 2 Banks
5	2 Banks 1 Bank 2 Banks

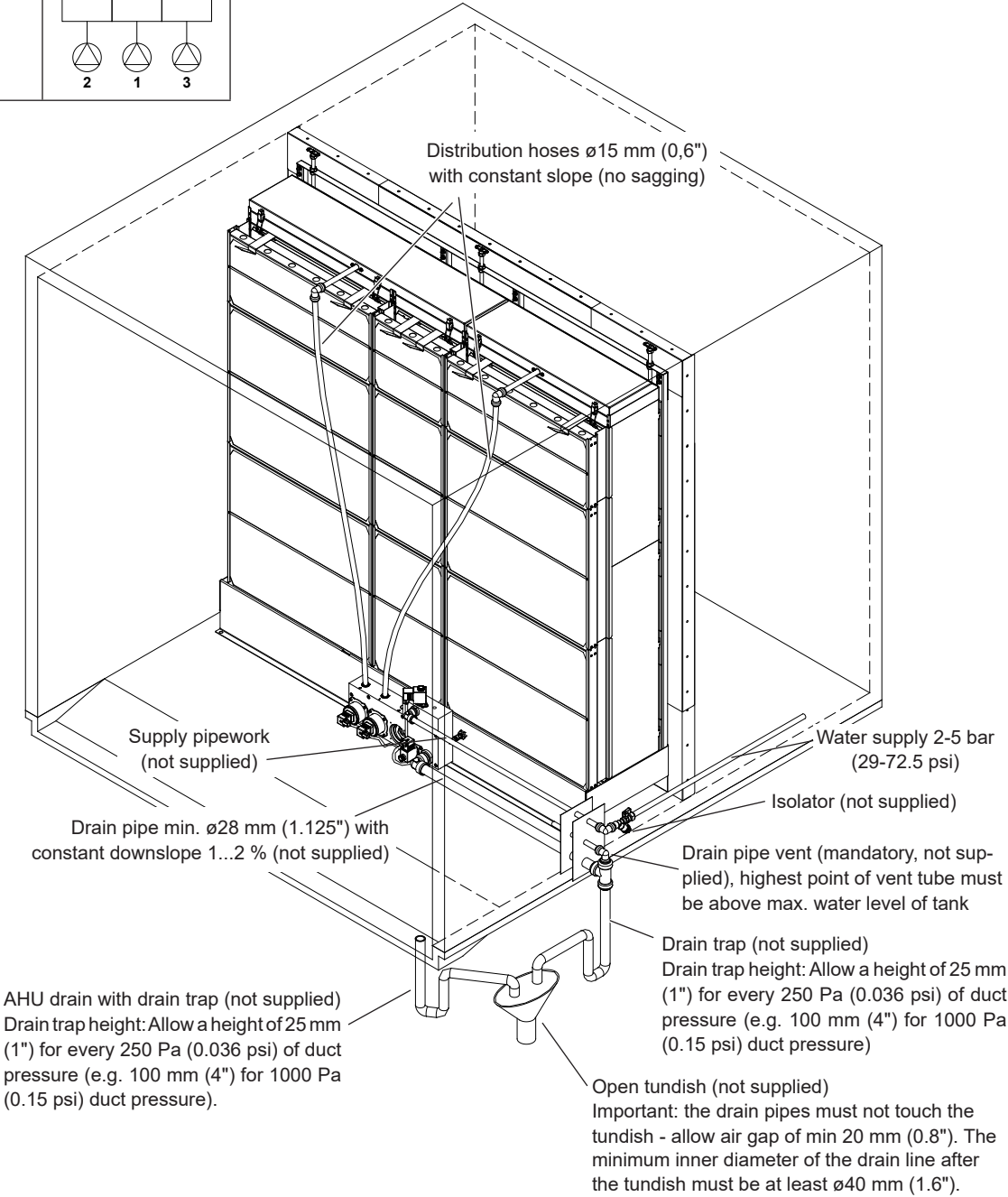


Fig. 12: Water installation (internal installation)

5.6 Mounting the control unit

5.6.1 Notes on positioning the control unit

Please observe the following notes when positioning the Condair MC unit:

- The control unit can be mounted directly outside to the AHU/air duct or to a wall or stand (not supplied).
- The control unit should ideally be positioned as close to the evaporative module as possible for ease of servicing and maintenance.

Note: the electrical components of the Condair MC hydraulic module are equipped with 5 m (16.4 ft) cables for connection to the control unit.. Make sure the control unit is mounted within the range of the inter-connecting cables.

- The control unit is protected according to **IP21**. Make sure the control unit is installed in a drip-proof location and the admissible ambient conditions are complied with (see technical data [chapter 10.1](#)).
- The power supply to the control unit must be equipped with an electrical isolator (not supplied) fitted within 1 m (39.4") for purposes of maintenance and emergencies. When positioning the control unit make sure the electrical isolator can be mounted within that range.

5.6.2 Recommended access requirements of the control unit

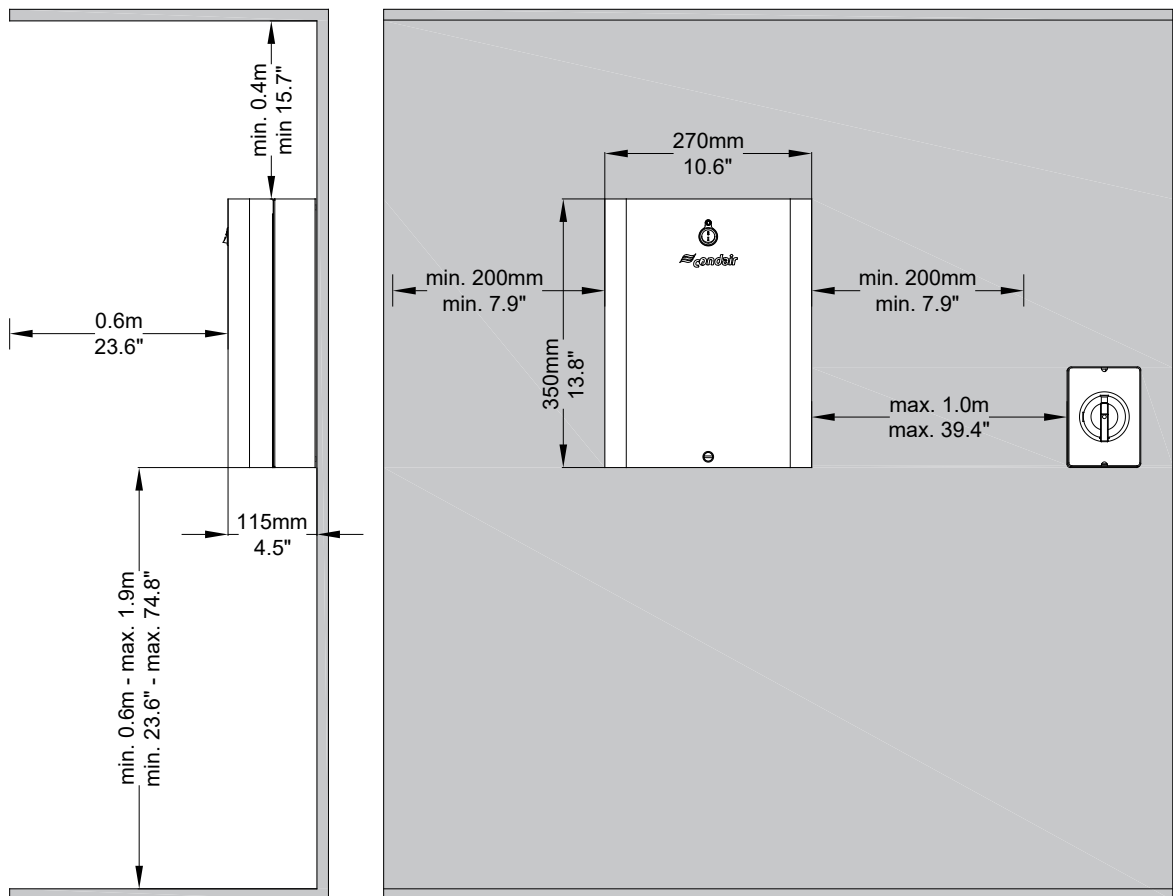


Fig. 13: Recommended access requirements of the control unit

5.6.3 Mounting the control unit

Important: if multiple systems have been supplied to a site, ensure that the serial number on the control panel corresponds to the serial number marked on the hydraulic module and the evaporative module.

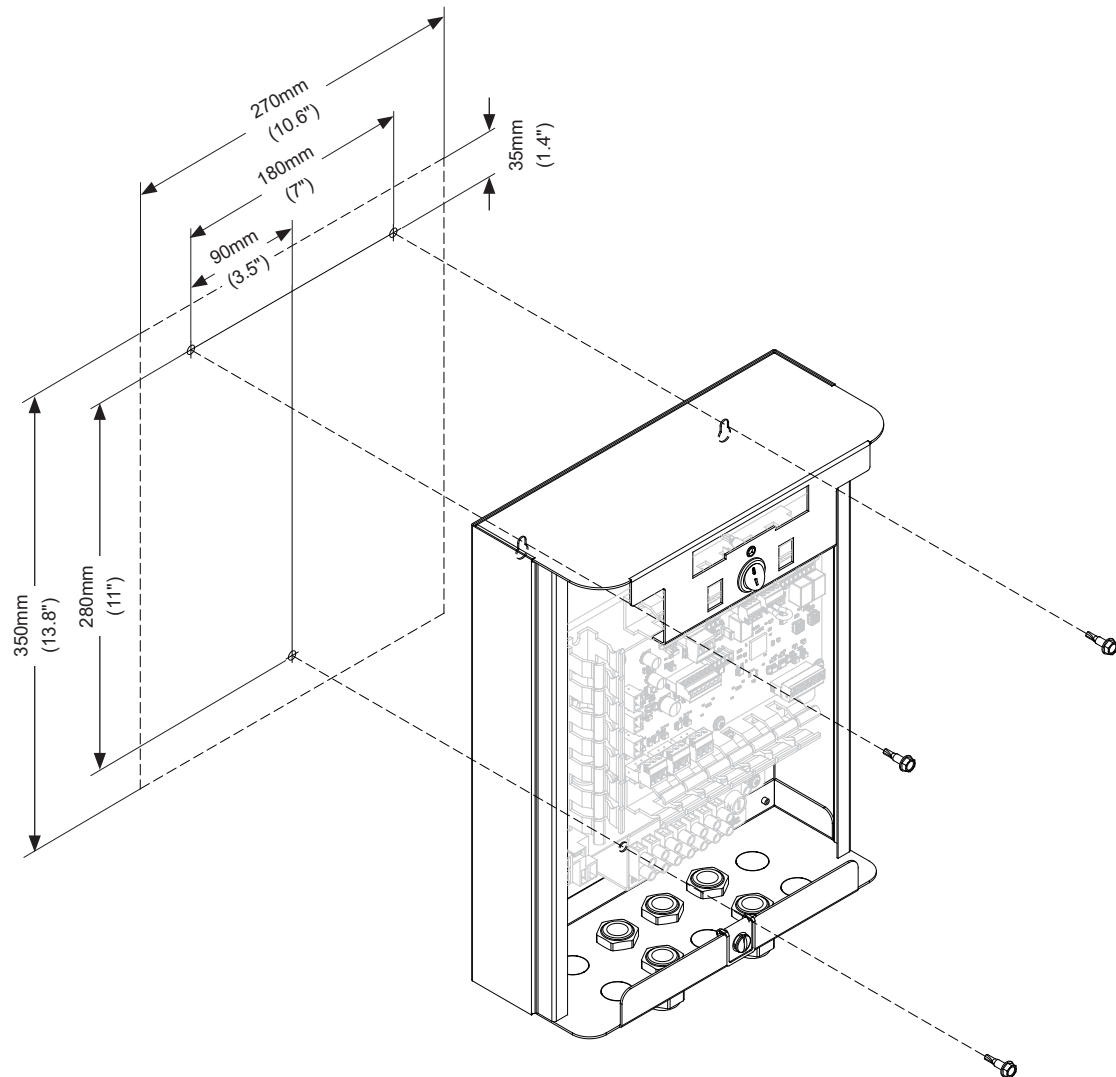


Fig. 14: Mounting the control unit of Condair MC

Mounting procedure:

1. Mark the 3 attachment points for the Condair MC control unit at the desired position with the help of a level.
2. Fit 2 appropriate fixings to the upper two points, do not fully tighten. Ensure the fixing heads can pass through the widest part of the keyhole slots of the control unit.
3. Hang up the control unit onto the two fixings through the keyhole slots.
4. Check the control unit is level and use a third fixing to secure the panel in position.
5. Tighten all fixings fully.

5.7 Electrical installation

5.7.1 Notes on electrical installation



DANGER!
Risk of electric shock!

The control unit contains live mains voltage. Live parts may be exposed when the control unit is open. Touching live parts may cause severe injury or danger to life.

Prevention: The control unit must be isolated from the mains before commencing any installation work.



WARNING!

The **electronic components** inside the control unit are **very sensitive to electrostatic discharge**. Before carrying out installations work inside the control unit, appropriate **measures must be taken to protect the electronic components against damage caused by electrostatic discharge (ESD protection)**.

- All work concerning the electrical installation must be performed only by **skilled and qualified technical personnel (e.g. electrician or technicians with appropriate training)** authorised by the owner. It is the owner's responsibility to verify proper qualification of the personnel.
- The electrical installation must be carried out according to the wiring diagram (see [chapter 5.7.2](#)), the notes on electric installation as well as the applicable local regulations. All information given in the wiring diagram must be followed and observed.
- All cables must be led into the control unit via the cable feed throughs on the bottom side of the control unit.
- The valve cables must be paired and fed through the large capacity cable gland in the position indicated below.
- It is strongly recommended that the mains supply is routed through the central cable gland to avoid overlapping low voltage cable runs in the cabinet.

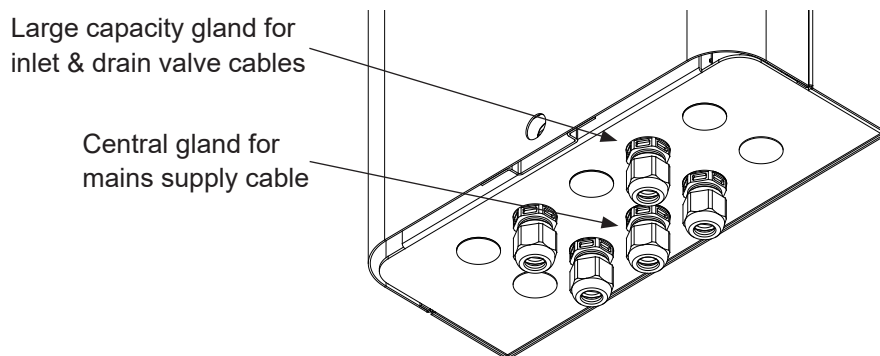


Fig. 15: Cable feed throughs control unit

- All cables from the hydraulic module mounted inside the AHU/air duct must be led via appropriate cable gland(s) out of the AHU/air duct.
- Ensure cables are secured in such a way that the insulation is not damaged by sharp edges and so that they do not create a trip hazard.
- Observe and maintain maximum cable length and required cross section per wire according to local regulations.
- The mains supply voltage must match the respective voltage stated on the rating plate.

5.7.2 Wiring diagram Condair MC

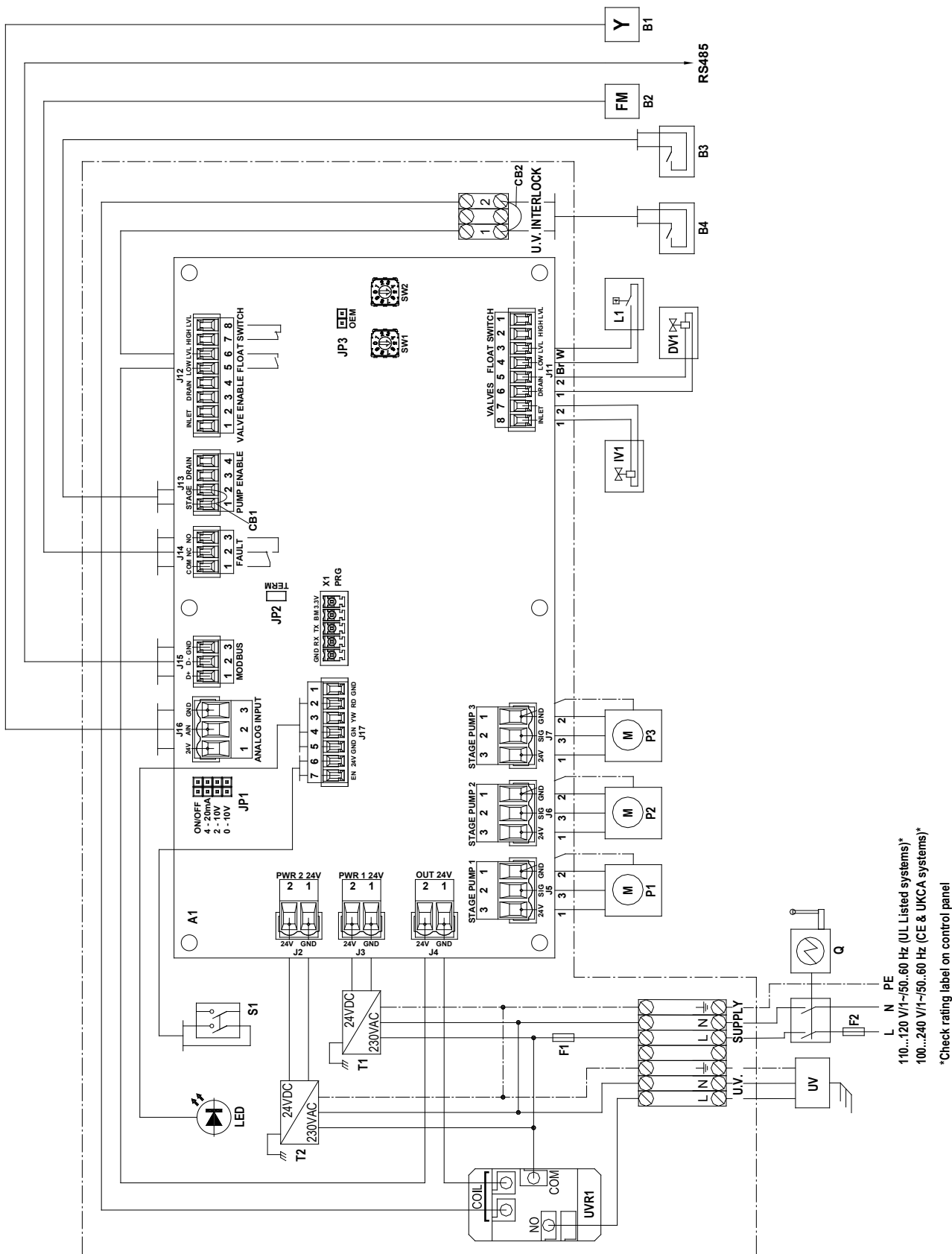


Fig. 16: Wiring diagram Condair MC

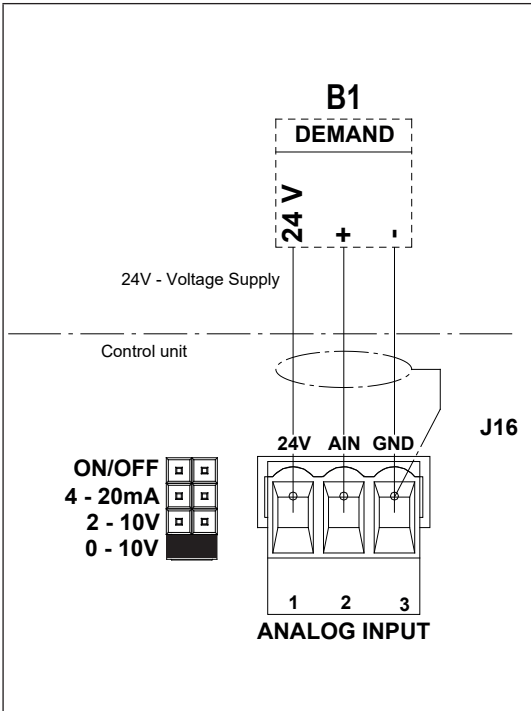
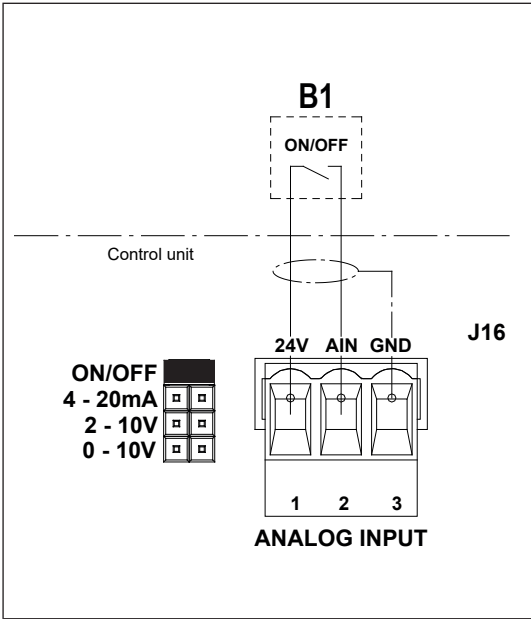
Legend wiring diagram Condair MC

A1	Control Board
B1	Demand or Humidity/Temperature Signal
B2	Fault Monitoring
B3	External Pump Enable (Volt-free contact)
B4	UV Door Interlock (Required for UL Submerged UV)
CB1	Cable Bridge (remove for External Pump Enable if B3 is connected)
CB2	Cable Bridge (Remove for UV Door Interlock)
DV1	Drain Valve
F1	Fuse Mains Supply (6.3 AT)
F2	External Fuse Mains Supply (max. 15 AT)
IV1	Inlet Valve
JP1	Control Signal Selection Jumper
JP2	Terminating resistor (plug in at the last station)
JP3	Leave open
L1	Level Switch
LED	Status Indicator LED
P1-P3	Stage Pumps 1-3
Q	Electrical Isolator or Plug Connection
S1	Standby/Operation Switch
SW1	Pump speed offset/adjustment
SW2	Setting drainage
SUPPLY	Terminal Mains Supply Voltage
T1	Power supply 1
T2	Power supply 2 (2 & 3 Pump Systems)
UV	Submerged UV (Option)
UVR1	Submerged UV Power Relay (Option)

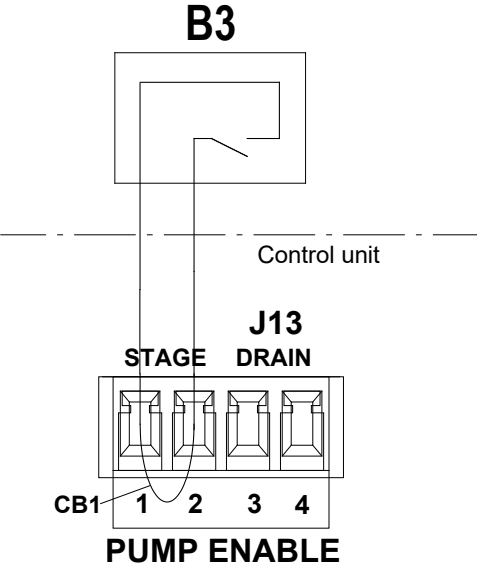
5.7.3 Installation work

Control signal (Y)

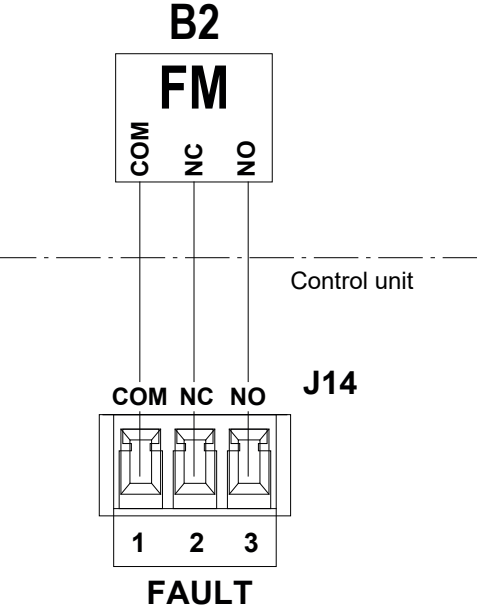
Note: the control signal type must be set via the Jumper JP1 on the Control Board. The appropriate input signal for the controller/sensor must be set to ensure correct operation.

	External continuous humidity or temperature controller An external continuous humidity or temperature controller is to be connected to the Analog Input contacts "AIN" (+) and "GND" (–) of the terminal block "J16" on the control board in accordance with the wiring diagram. The jumper JP1 must be set to one of the admissible signal values shown. The connecting cable must be fed through a free cable gland into the control unit. The shielding of the control signal must be connected to terminal "GND". Caution! If the shielding of the control signal is already connected to a potential or a grounded conductor, do not connect it to terminal "GND".
	24 VDC On/Off humidistat A 24 VDC On/Off humidistat is to be connected to the contacts "24V" and "AIN" of the terminal block "J16" on the driver board. The jumper JP1 must be set to "ON/OFF". The connecting cable must be fed through a free cable gland into the control unit. The shielding of the control signal must be connected to terminal "GND". Caution! If the shielding of the control signal is already connected to a potential or a grounded conductor, do not connect it to terminal "GND".

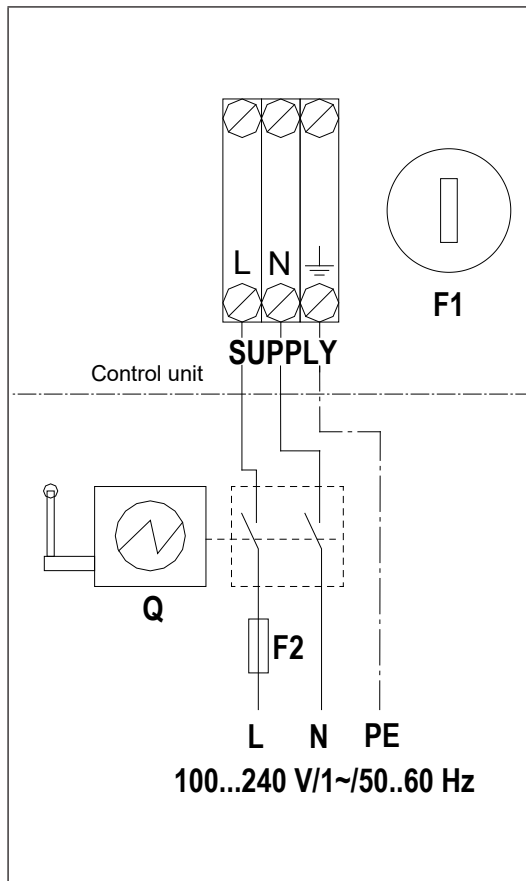
External Pump Enable

	The potential-free contact of an external enable switch is connected to the contacts "1" and "2" of the terminal block "J13" on the control board in accordance with the wiring diagram. The connecting cable must be fed through a free cable gland into the control unit If no external enable switch is connected, a cable bridge "CB1" must be installed on the contacts "1" and "2" of the terminal block "J13". CAUTION! Do not apply any extraneous voltage to terminals via the enable switch.
---	--

Connecting the fault indication output

	The fault indication output at terminal block "J14" consists of a potential-free switching relay contact for the connection to a BMS fault indication circuit: The connecting cable must be fed through a free cable gland into the control unit. The maximum contact loading is 1A-24V AC/DC. Appropriate suppressor modules are to be used for the switching of relays and miniature contactors.
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Mains voltage supply



CAUTION! Before connecting the mains voltage supply, make sure the voltage indicated on the rating plate meets the local line voltage. Otherwise, do not connect the control unit.

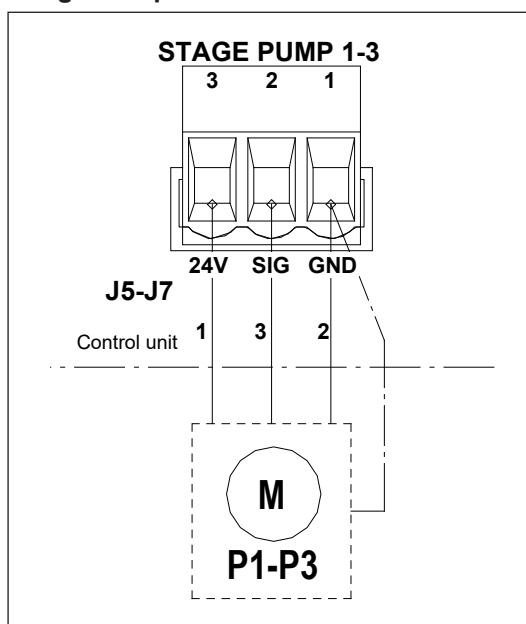
Connect **mains voltage supply** 120V (UL) or 230V (CE)/ 1~/50...60 Hz in accordance with the wiring diagram, to the **terminal block "SUPPLY"** in the control unit. The mains supply cable must be led into the control unit via a cable gland on the bottom of the control unit. The internal fuse F1 for the mains supply is mounted in the holder next to the terminals.

The installation of the **fuse F2** (max. 15 A, slow acting), the **electrical isolator "Q"** (all pole disconnecting device with a minimum contact clearance of 3 mm/0.12") and a fault current protection switch with 30 mA trigger current (by client) in the mains supply line **are mandatory**.

The electrical isolator must be mounted in direct proximity of the control unit (max. distance 1 m/39.4") and must be easily accessible in a height between 0.6 m/23.6" and 1.9 m/74.8" (recommended: 1.7 m/66.9").

The cross-section of the mains cable must comply with the applicable local regulations (min. 1.5 mm²/0.0023 sq.in.).

Stage Pump Connection



Connect the stage pump cable(s) to the terminals at the corresponding position(s) on the control board.

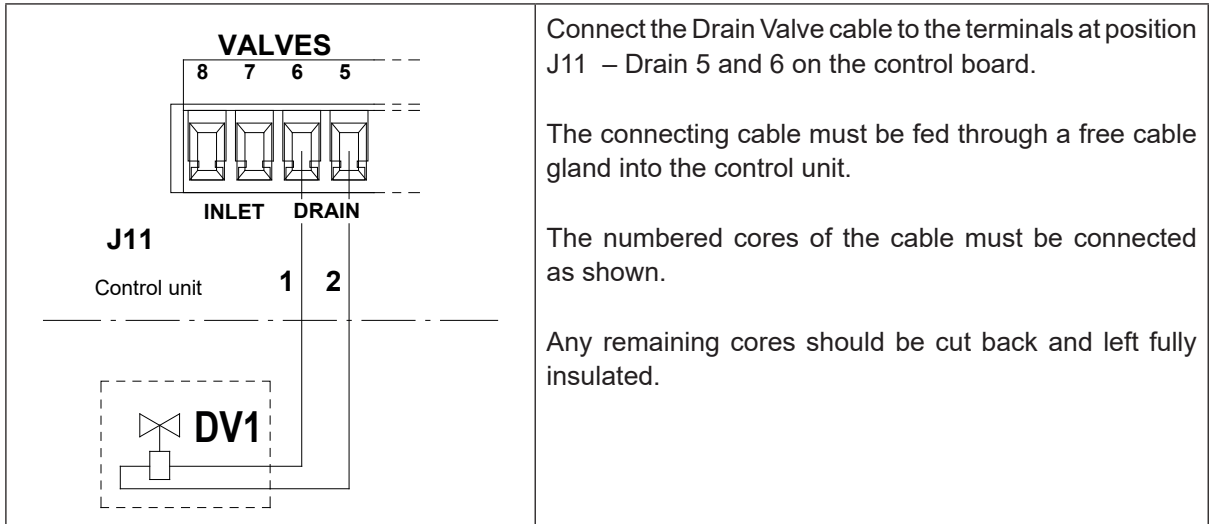
Stage Pump 1 - J5
Stage Pump 2 - J6
Stage Pump 3 - J7

The connecting cable must be fed through a free cable gland into the control unit.

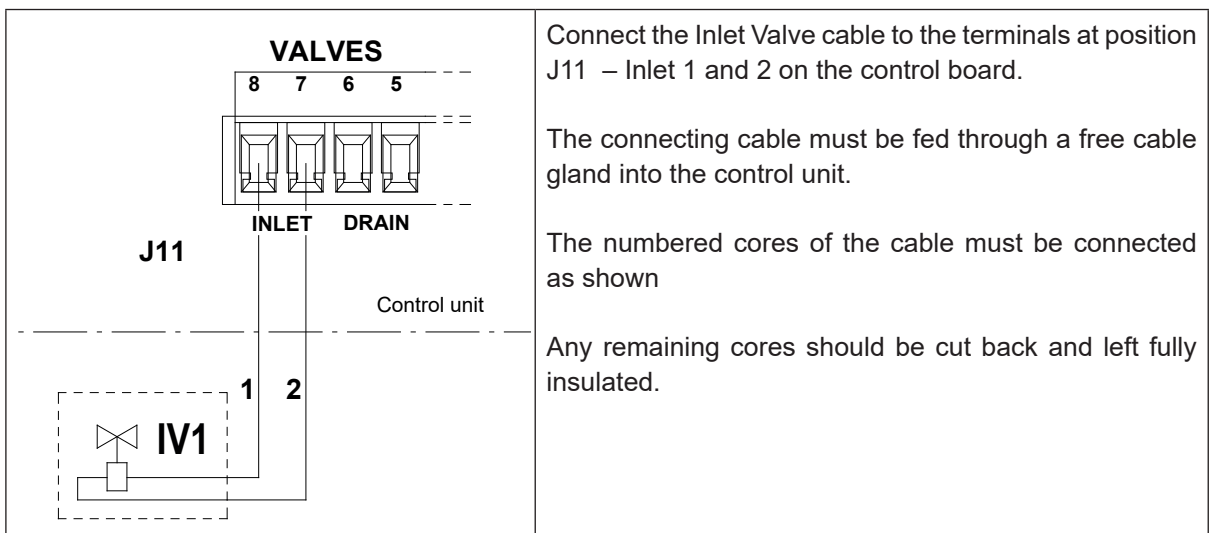
The numbered cores of the cable must be connected as shown, the Green/Yellow earth wire must be paired with the Black wire in the GND terminal.

Note: Twin ferrules which crimp 2 wires together are recommended when pairing wires to ensure a good connection to both terminations.

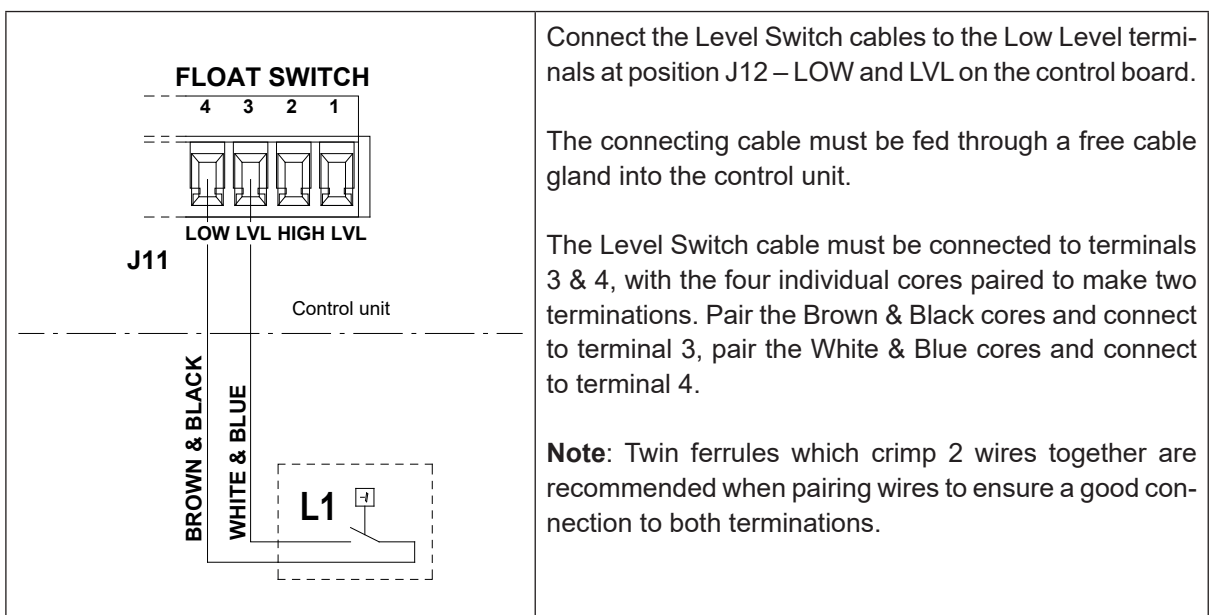
Drain Valve Connection



Inlet Valve Connection



Level Switch Connection



5.7.4 Installation of Options

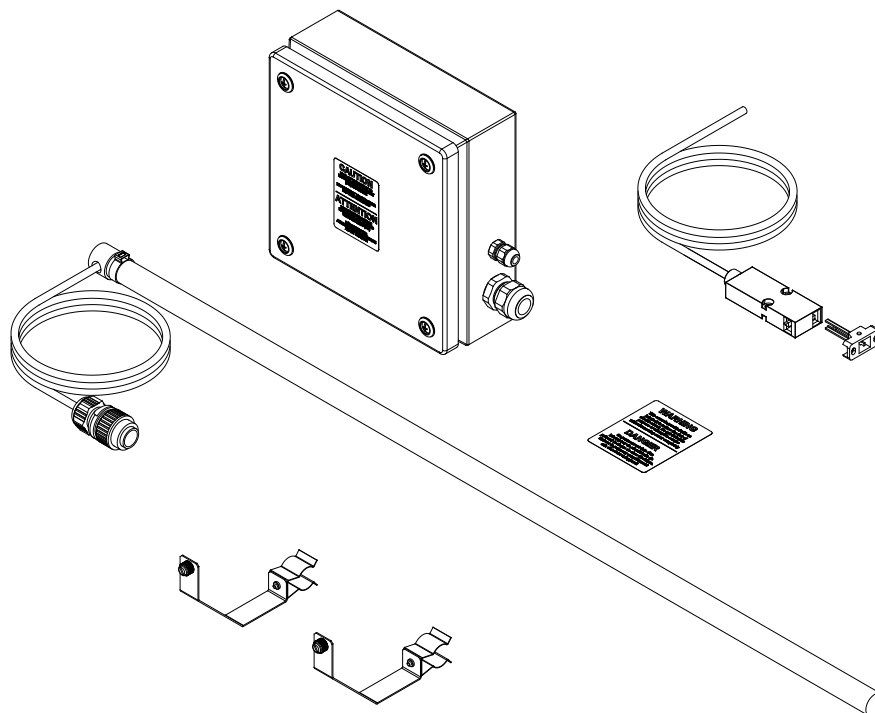
5.7.4.1 Submerged UV – General Notes

The Condair MC can be equipped with an optional Submerged UV System, whereby up to 3 UV lamps are positioned in the tank underneath the evaporative cassettes and connected to a power distribution box mounted on the rear face of the tank. This distribution box is then connected to the Condair MC control unit.

When the water level in the tank reaches the lower operating level the lamps switch on. UV light is effective in killing bacteria in water systems. However the Condair MC system should always be supplied with a clean water supply.

The Submerged UV system consists of the following components:

- Power distribution box with tank hanging bracket (UL version pictured)
- 1, 2 or 3 UV lamps in waterproof sleeves (depending on the size of the evaporative module)
- 2 mounting brackets per lamp with fixing screws
- 10 m (32.8 ft) 3 core connecting cable and cable gland
- Duct warning label
- Door interlock and cable gland (included in UL version only)



To install the lamps and distribution box to the tank, follow the steps outlined in [chapter 5.3.3](#), part 7.

A caution label is also provided to alert site operatives to the use of ultraviolet light in the system, this should be mounted to the AHU access covering in a clearly visible position.



CAUTION!

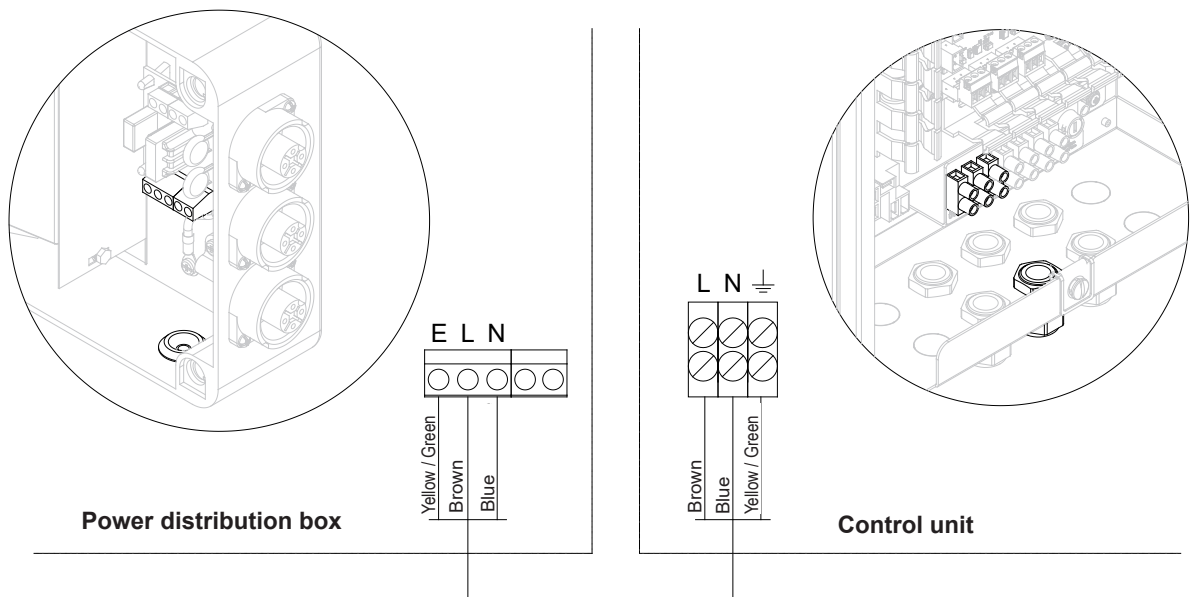
High intensity shortwave ultraviolet light.

Do not stare at lamps directly. Refer to safety instructions.

5.7.4.2 Install CE Submerged UV

Connect the distribution box to the Condair MC control unit

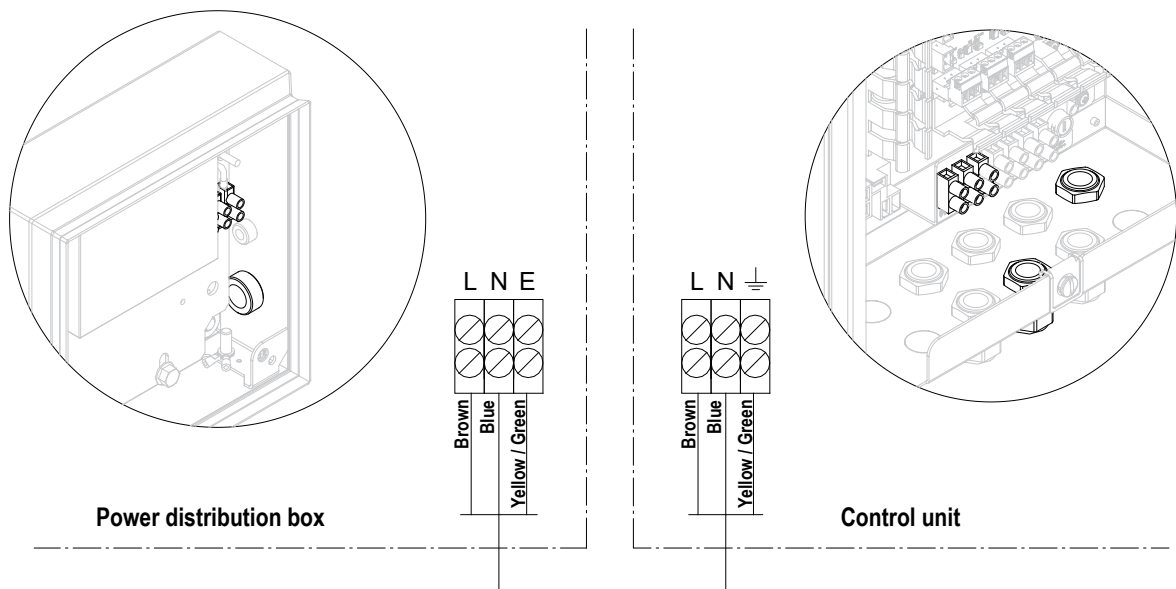
1. Isolate power supply to the Condair MC control unit, and secure electrical isolator in "Off" position against inadvertent switching on.
2. Remove the front cover of the control unit.
3. Knock out the blank and fit the provided cable gland in the position shown inside the panel.
4. Connect earth, live and neutral wires of the 3 core connecting cable to terminals "E L N" in the power distribution box according to the wiring diagram below and the applicable local regulations.
5. Lead 3 core connecting cable through the AHU wall into the control unit via the cable gland and cut cable to length required.
6. Connect earth, live and neutral wires of the 3 core connecting cable to terminals "U.V." according to the wiring diagram below and the applicable local regulations. Ensure the cable between the AHU and control unit is secured and tidy.
7. Apply the Warning label in a clearly visible position on the access panel / covering.



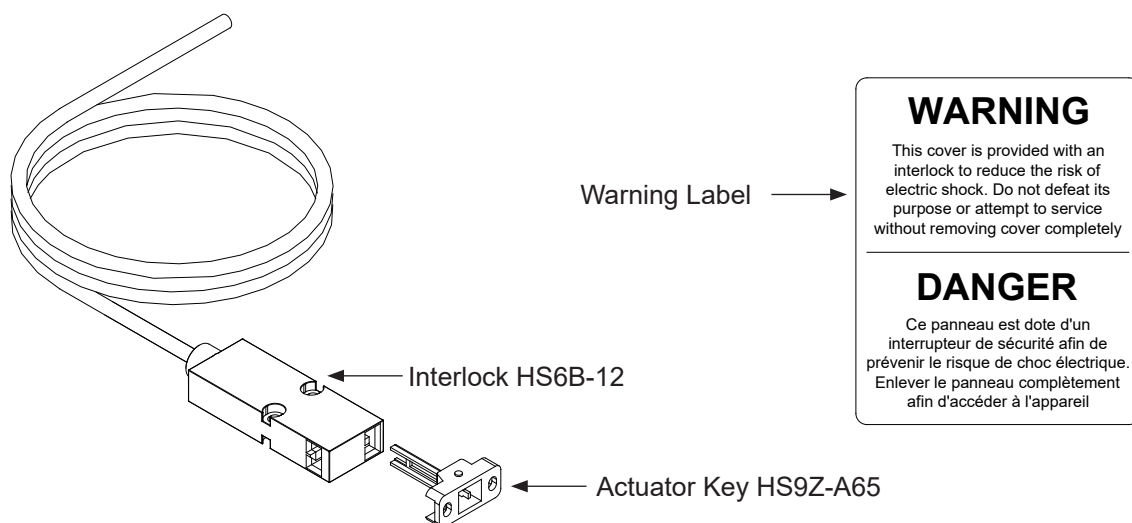
5.7.4.3 Install UL Submerged UV

Connect the distribution box to the Condair MC control unit

1. Isolate power supply to the Condair MC control unit, and secure electrical isolator in "Off" position against inadvertent switching on.
2. Remove the front cover of the control unit.
3. Knock out the blanks and fit the provided cable glands in the 2 positions shown inside the panel.
4. Connect earth, live and neutral wires of the 3 core connecting cable to terminals "L N E" in the power distribution box according to the wiring diagram below and the applicable local regulations.
5. Lead 3 core connecting cable through the AHU wall and into the control unit via the central cable gland, and cut cable to length required.
6. Connect earth, live and neutral wires of the 3 core connecting cable to terminals "U.V." according to the wiring diagram below and the applicable local regulations. Ensure the cable between the AHU and control unit is secured and tidy.



The UL Submerged UV system is supplied with an interlock kit which is intended for installation on the AHU cover/door and prevent the UV lamps from operating while the unit is being inspected. This is a safety component and must be fitted to maintain the MC systems UL listed status.



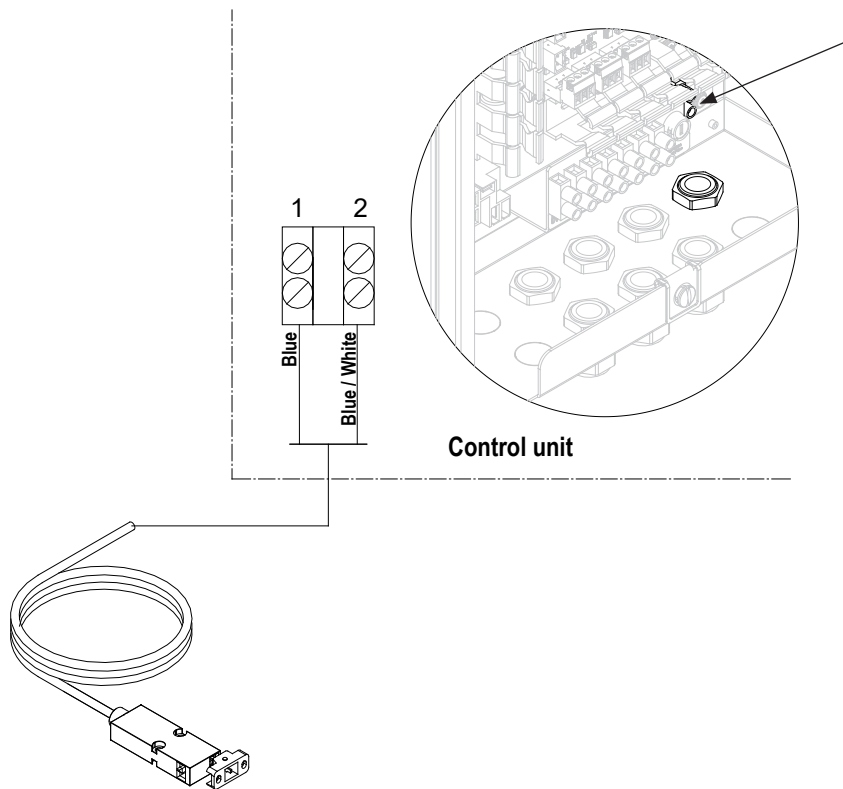
Connect the interlock kit to the Condair MC control unit

Access panels and coverings will vary on site and it is the customer and installers responsibility to fit the interlock device correctly so that the operation of the UV lamps is interrupted when the AHU covering is removed or opened. The device must be installed in accordance with with local regulations.

1. Isolate power supply to the Condair MC control unit, and secure electrical isolator in "Off" position against inadvertent switching on.
2. Identify an appropriate position on the AHU opening for the interlock and key components, and install following the manufacturers instructions, provided with this manual.
3. Run the connecting cable from the interlock out of the AHU and into the control unit via the previously fitted cable gland.

Note: A suitable cable wall feed through must be installed (and sealed) by the customer.

4. Connect the blue and blue/white wires of the multicore interlock cable to the interlock terminals 1 & 2 according to the wiring diagram below and the applicable local regulations. Cut back and terminate all other wires. Ensure the cable between the AHU and control unit is secured and tidy.
5. Apply the Warning label in a clearly visible position on the access panel / covering.



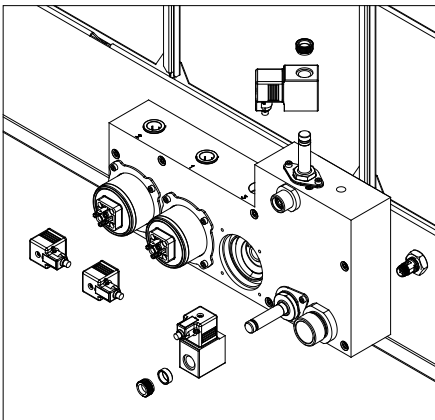
5.7.4.4 Blanking Plates

The space between the AHU walls and the Condair MC evaporative module must be blanked off to ensure all air travelling through the duct passes through the evaporative media. Pre-formed modular blanking plates are available as an option, quantity and sizes are determined during pre-sales specification.

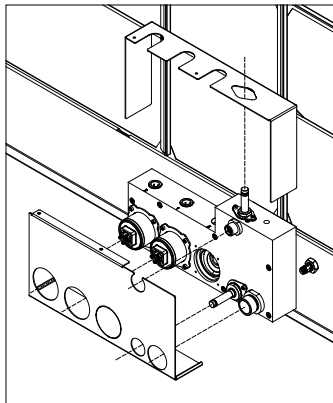
To install the blanking plates to the AHU and MC system, follow the steps outlined in [chapter 5.3.3](#), part 5.

5.7.4.5 UL Hydraulic Cover

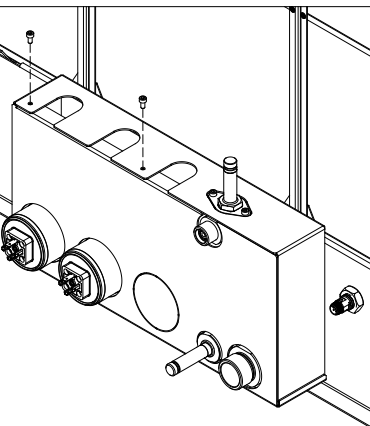
To comply with UL standards, an additional metal cover must be fitted to the hydraulic plate. This consists of two parts which should be fitted prior to connection of the inlet and drain pipework.



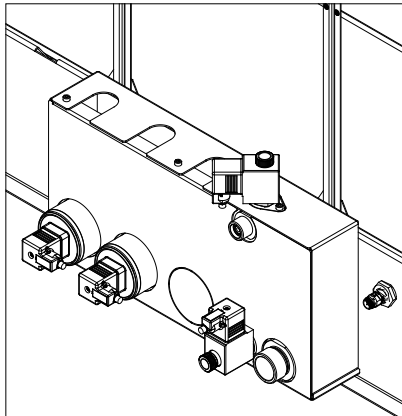
1. Remove all pump plugs and solenoid coils from the hydraulic plate assembly.



2. Fit the lower section of the hydraulic cover over the front face of the hydraulic plate, the pump(s), drain valve, drain fitting and inlet fitting pass through the provided cutouts in the cover.



3. Fit the upper section of the hydraulic cover over the top of the hydraulic plate, the inlet valve must pass through the cutout, the angled lip will hook over the edge of the tank and the sides will fit inside the base of the lower section.



4. Align the holes on the upper section with the bushes on the lower section and secure in place using 2 x M4x8 screws.

5. Replace the pump plugs and solenoid coils on the hydraulic plate assembly, ensuring the correct location on the respective components.

6 Operation

6.1 Important notes on operation

Qualification of personnel

The Condair MC must be commissioned and operated only by personnel familiar with the system and adequately qualified for the respective tasks. It is the owner's responsibility to verify proper qualification of the operating personnel.

General notes

The instructions and details regarding commissioning and operation must be followed and upheld.

The initial commissioning of the Condair MC requires appropriately trained technical personnel. It is strongly recommended that your Condair representative commissions your system. Part of this initial commissioning process is a disinfection of the water tank, and if required the evaporative cassettes. Please read this document in full before commencing any work.

Please pay attention to local regulations regarding working at heights and electrical work.

Safety and hygiene



DANGER!

The Condair MC must be operated in accordance with this manual. Failure to do so could result in contamination that might cause Legionnaires' disease, which can be fatal.



WARNING!

The Condair MC control unit should not be electrically isolated for periods exceeding 24 hours as automatic drain and purge cycles will be disabled.

6.2 Initial Commissioning

The initial commissioning of the Condair MC requires appropriately trained technical personnel. We strongly recommend that your Condair representative commissions your system.

Pre-commissioning inspections

Prior to initial commissioning the complete system must be inspected for correct execution of the installations. Proceed as follows:

1. Switch off AHU.
2. **Evaporative module installation:** Check correct selection of evaporative module on rating plate if multiple units on site. Check that the evaporative module has been installed level in all planes with secure blanking plates to prevent air bypass. Check that there is sufficient access for cassette removal during maintenance. Ensure assembly is securely fixed, and that there is no visible damage. Check that the evaporative module is installed in a waterproof section. Check evaporative module (including tank) is free of dirt/ debris and clean as necessary.
3. **Control unit installation:** Check that the control unit is mounted in a convenient dry location outside the AHU/air duct.
4. **Supply water Installation:** Ensure the water system in the building has been subject to a Risk Assessment. The Condair MC must be connected to a clean, wholesome mains water supply. It is the responsibility of the user to ensure that the water system complies with local regulations and bylaws, particularly those for the control of Legionella microbes. The use of mains water fed tanks and reservoirs is only permitted as part of a managed water treatment system. Check that the evaporative module has a feed water supply between 2 bar (29 psi) and 5 bar (73 psi) connected to the supplied approved filling hose. Ensure that any hygiene options have been correctly installed. Check all joints and fittings for leaks.
5. **Drain installation:** Check that the drain line is made according to the corresponding instructions given in the installation manual. Ensure the drain line is connected to the main building drain and that drain pipe work is trapped to a suitable level for the applicable working duct pressure. Check all joints and fittings. Ensure that the drain connection includes an air gap.
6. **Distribution pipe work:** Check all water distribution pipe work between the hydraulic module and the distribution headers are securely fitted.
7. **Electrical wiring:** Check all electrical connections with reference to the corresponding wiring diagram in this manual. Check that a 120 V (UL) or 230 V (CE) / 10 A single phase supply is connected to the control unit. Ensure that this power supply is isolated with an electrical isolator within 1 m (39.4") of the control unit.
8. **Optional controls:** Check that appropriate controls connections have been made to the control unit. Refer to the controls wiring section of this manual.
9. **Flush water supply and test supply water quality:** Disconnect water supply pipe from connector on the hydraulic module. Fix hose to free end of supply pipe and lead hose to a drain. Carefully flush the supply pipe for at least 10 min without creating splashing or aerosols.

Take a water quality sample to ensure that supply water meets the requirements specified in the water quality guide. The sample should be tested using a dip slide to indicate the total number of colony forming units per ml (cfu/ml). Generally, levels of 10^3 cfu/ml may be considered acceptable for this type of humidifier provided the species of microbes and/or fungi involved are themselves not considered to be harmful. If you are unsure of the quality of your water please consult your Condair distributor for advice.

Then reconnect the water supply pipe to the supply connector on the hydraulic module.

10. **Leak test:** Turn on water supply and check for leaks. Ensure shut off valve is installed correctly.

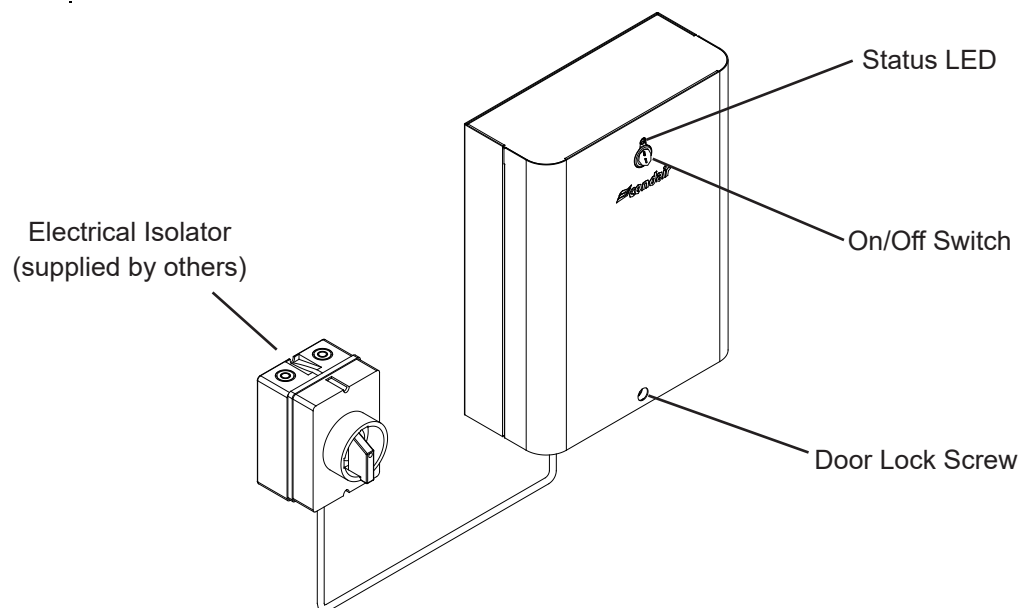
After the system has been inspected and found correct proceed with the initial commissioning:

1. Ensure AHU is switched off.
2. Switch on electrical isolator, and then the switch on the control unit.
3. Simulate full demand and check components are operating correctly.
4. Check correct water level and pump activation.
5. Check water can flow to drain correctly.
6. Test correct flow of water to distribution header. If necessary, use SW1 on the control board to increase or decrease the pump flow.
 - Each pump output should be set to supply 5 l/min to the header, this can be measured using an unobtrusive method such as an ultrasonic flow sensor, in-line flow meters will restrict the flow from the pump and give an inaccurate reading. SW1 default setting is "5".
 - Increase setting at SW1 if flow is too low, or media is not becoming fully wet within 10 minutes.
 - Decrease setting at SW1 if water droplets are being carried from the system in the air stream (when the fan is running).
7. Test any fitted options (see [chapter 5.7.4](#)).
8. Set the drainage at SW2 on the control board according to the table [chapter 6.5.1](#).
9. If the evaporative cassettes had become dirty or damp prior to commissioning, follow the disinfection procedure described in [chapter 7.8](#) and [chapter 7.9](#) of this manual.
10. Perform a media wash over cycle (see [chapter 6.5.4](#)).
11. Switch on fan of AHU and test operation with fans running and validate air conditions against the design data.
12. Test control devices.
13. Switch off AHU, and ensure AHU is locked-off to prevent it from starting.
14. Remove any demand from the MC system.
15. Drain the tank and wipe tank clean.
16. Perform disinfection:
 - Send a demand to the unit to make it fill and start running (the demand signal can be overridden for the duration of the disinfection using the "ON/OFF" control jumper pins at JP1 and installing a cable bridge between terminals AIN and 24 V at J16).
 - Add a disinfection chemical according to tank volume.
 - After the disinfection process has completed, neutralise disinfectant, if required.
17. Reinstate the demand signal settings as required (allowing normal control to be resumed) and check correct control operations (signals, fault outputs, Modbus).
18. If commissioning has not been completed by an approved Condair representative, it is recommended that records are kept of commissioning date and board settings.
19. Demonstrate system to customer and highlight hygiene and maintenance requirements.
20. Raise any installation concerns.
21. Issue commissioning documentation.

The system is now ready for normal operation.

6.3 Control Unit operating elements

The Condair MC Control unit uses the following features during normal operation:



6.4 Start up for normal operation

It is assumed that initial commissioning has been carried out properly by the service technician or your Condair representative.

If the Condair MC has been out of operation for a prolonged period of time, a complete system service has to be performed prior to the start up.

The following description outlines the start up procedure for normal operation. Proceed as follows to prepare the Condair MC for operation:

1. Switch off AHU.
2. Examine the Condair MC for possible damage and faulty installation. Ensure tank is empty.
3. Close doors of AHU if open, then switch on AHU if switched off.
4. Open shut-off valve in the water supply line.
5. Make sure the front panel of the control unit is mounted and fixed with the retaining screw.
6. Switch on the electrical isolator in the mains supply line (mains supply to control unit).
7. Monitor inlet purge cycle and subsequent drain down, approx. 3 minutes.
8. Switch <Control unit On/Off> switch on the front of the control unit to "On", and activate control unit via the external enable switch if necessary. Check for any fault indication on the LED above the switch.

In the event that the Condair MC has been disconnected from the mains for more than 48 hours:

- Switch off control unit via the electrical isolator in the mains supply line.
- Risk assess the system and check the need for disinfection.
- Close shut-off valve in the water supply line (switch off the AHU if the shut off valve is located inside the AHU).
- Disconnect water supply line from the connector on the hydraulic module. Caution should be taken to ensure no splashing is created.
- Connect hose to the open end of the water supply line and lead the hose into open tundish outside the AHU.
- Open shut-off valve in the water supply line and flush water supply line an appropriate length of time. Then, close shut-off valve again, remove hose and reconnect supply line to the connector on the hydraulic module.
- Open shut-off valve in the water supply line, switch on the electrical isolator in the mains supply line, then switch on control unit via the <Control unit On/Off> switch.

The Condair MC is now in normal operating mode.

6.5 Notes on Operation

6.5.1 Important notes on operation

- For hygiene reasons the supply valve will open while the system is in standby mode at regular intervals in order to flush water supply line and prevent stagnation. This cycle will be performed when power is first applied to the system, followed by a 2 minute drain down period.
- If the tank is left filled for a prolonged time with demand not present, the tank will be drained to prevent stagnation. The cycle will be interrupted if the system receives a demand signal.
- A daily forced drain down will occur if the system has been unable to perform a drain cycle for 24 hours. This cycle cannot be interrupted and ensures a regular fresh supply to the system.
- Where a demand signal is used to control the system, the individual stage pumps will only activate once the signal has reached the following thresholds:

Stage 1 = 5 %

Stage 2 = 33 %

Stage 3 = 66 %

The stage pumps will switch off as demand falls to 2% under each stage switching threshold.

- During operation the drain valve will be opened periodically to allow recirculated water to be replaced with fresh supply water, this helps reduce the mineral content of the water held in the tank and recirculated, reduces limescale build-up and prolongs the life of the media cassettes. The frequency of this cycle can be set using potentiometer SW2 on the control board, refer to the table below for suggested settings based on incoming supply water quality:

		pH Level								
		6	6.25	6.5	6.75	7	7.25	7.5	7.75	8
Conductivity [μ S/cm]	50	2	2	2	2	2	2	2	2	2
	100	2	2	2	2	2	2	2	3	4
	150	2	2	2	2	2	2	3	4	6
	200	2	2	2	2	2	3	4	6	9
	250	2	2	2	2	3	4	6	8	
	300	2	2	2	2	4	5	7	9	
	350	2	2	2	3	4	6	8		
	400	2	2	2	3	5	7	9		
	450	2	2	3	4	6	8			
	500	2	2	3	4	6	9			
	550	3	2	4	5	7	9			
	600	3	3	4	5	8				
	650	3	3	4	6	8				

SW2 Drainage rate

These are the recommended settings, adjusting the potentiometer lower will reduce the amount of water drained away and may result in increased mineral build-up in the media cassettes. Should build-up occur the potentiometer can be set higher, this will increase the amount of water drained away.

6.5.2 System status indication

The LED on the front of the control panel indicates the following operating system status:

- Green - Normal Operation (flash indicates no demand, system in standby)
- Amber - No enable / fault (sequence of flashes indicates area of fault, see [chapter 8.1](#))
- Red - Inlet/drain fault (sequence of flashes indicates area of fault, see [chapter 8.1](#))

6.5.3 Recommended regular checks on operation

During operation the Condair MC has to be checked periodically in accordance with the table below:

Operations / Checks	Daily	Weekly	Monthly	Quarterly
Monitor humidity/temperature control	✓	✓	✓	✓
Check for any low humidity/temperature concerns	✓	✓	✓	✓
Check any alarms on BMS	✓	✓	✓	✓
Visible check for: – Units switched on with no fault lights – No water leakage (air on and air off side) – No water flow to drain (water may flow to drain during drain cycle and when unit loses humidity demand) – System components for correct fixing and any damage – Electric installation for any damage.	✓	✓	✓	✓
All UV bulbs are active (with water level), if applicable		✓	✓	✓
Media is saturated (relative to demand signal)			✓	✓
Condition of tanks and air on media is clean			✓	✓
Inspect and determine replacement frequency of sediment filter			✓	✓
Add disinfection chemical (according to tank volume)			✓	✓
Condition of tanks are clean (clean as required)				✓
Water level is correct (ensure unit is not in drain cycle)				✓

If the checks reveal any irregularities (e.g. leakage, error indication) or any damaged components take the Condair MC out of operation as described in [chapter 6.7](#). Then, have the malfunction eliminated or the damaged component replaced by a well trained specialist or a service technician from your Condair representative.

6.5.4 Media Wash Over



WARNING!

New fibre media contains aluminium sulphate - a by product of the manufacturing process. Aluminium sulphate can cause water carry over and other potential issues to the system. Evaporative media **MUST** be flushed as part of the commissioning process to remove the aluminium sulphate.

For further information and guidance on the Media Wash Over Cycle process please contact Condair.

At initial commissioning or any time new fibre evaporative cassettes have been installed, a media wash over cycle has to be performed. If a media wash over cycle is required proceed as follows:

- Switch off the AHU, and ensure AHU is locked-off to prevent it from starting and avoid carry over.
- Send a demand to the unit to make it fill and start running (the demand signal can be overridden for the duration of the disinfection using the "ON/OFF" control jumper pins at JP1 and installing a cable bridge between terminals AIN and 24 V at J16).
- Once the unit is running and the media saturated, remove the DIN plug from the drain valve and ensure it is protected from water ingress.
- Leave the unit to run with the drain open for the time required according to the table below. The tank will fill and drain whilst running and flush through the evaporative cassettes to remove the aluminium sulphate from the system.

System Height (mm)	Media Wash Over Duration (mins)
<1000	60
1000-2000	90
2000-3000	120

Note:

If there is evidence of surfactant in the tank once the suggested duration has elapsed, the Media Wash Over cycle should be extended. If at any point the Media Material is replaced, a Media Wash Over Cycle must be completed.

- When the required time has elapsed, and the water in the system is running clean without a soapy texture, the DIN plug can be plugged into the drain valve and any control method overrides can be removed.

6.6 Modbus Communication

System status data can be read from the controller using Modbus RTU protocol via a RS485 connection to the terminals at J15 of the MC Control board.

Jumper JP2 (TERM) only has to be set for the last devices in the net (end of line termination at the beginning and end of the Modbus network). Jumper JP2 set = end of line termination resistor activated.

Communication settings – Read with function 04, Write with function 16

Description	Range	Input Register 1-based	Format
Device ID / Address	1 - 247	36884	UInt32 (Little endian)
Baud Rate (bit/s)	0 = 4800 1 = 9600 2 = 19200 3 = 38400 4 = 57600 5 = 115200	36888	
Parity	0 = None (single stop bit) 1 = None (second stop bit) 2 = Odd 3 = Even	36892	

Default Settings: Device ID/Address: 1, Baud rate: 19200, Data Bits: 8, Parity: Even, Stop bits: 1

Status indication – Read with function 04

Description	Range	Input Register 1-based	Format
External Enable	0 = Open 1 = Closed	30005	UInt16
Enable Switch	0 = Open 1 = Closed	30006	
Demand Percentage*	0 - 1000 (% x10)	30007	
Water Level	0 = Empty 1 = Filled	30008	
Inlet Valve	0 = Closed 1 = Open	30009	
Drain Valve	0 = Open 1 = Closed	30010	
Number of pumps demanded	1 - 3	30011	
Fault Output	1 = Drain Timeout 2 = Fill Timeout 3 = Pump Fault 4 = Supply Voltage 5 = PCB Fault	30012	
Operating Status	0 = Disabled 1 = Standby 2 = Running 3 = Drainage cycle 4 = Draining 5 = Hard Fault	30013	

* Demand Percentage will read 0 if external enable is open or enable switch on panel is Off

6.7 Decommissioning the system

In order to decommission the Condair MC (e.g. to perform maintenance works, to eliminate a malfunction, etc.) perform the following steps:

1. If the system has to be switched off because of a malfunction, please note the fault mode sequence displayed by the LED.
2. Close the shut-off valve in the water supply line.
3. Switch off the <Control unit On/Off> switch on the control unit, and if necessary deactivate control unit via the external enable switch.
4. Disconnect control unit from the mains: switch off the electrical isolator in the mains supply to the control unit and secure switch in "Off" position against accidentally being switched on.
5. Let the fan of the ventilation system run until the evaporative module is dry.
6. If work has to be carried out on the evaporative module or the hydraulic module mounted inside the duct, switch off the AHU and secure the system against accidentally being switched on.

Important Notes

- If the Condair MC is in working order, then for hygiene reasons we recommend that the system should be left powered on, even if the Condair MC is not going to be used for a prolonged period of time. To prevent the Condair MC from humidifying/cooling switch off the <Control unit On/Off> switch on the control unit, and if necessary deactivate control unit via the external enable switch. This keeps the hygiene functions (e.g. periodical flushing of water supply pipe) active and hence the build-up of bacteria is opposed.



DANGER!

If the Condair MC is isolated from the mains power for a prolonged period, water stagnation might occur in the supply pipe work, and microbial contamination of the supply pipe work and Condair MC could result.

- If the Condair MC is to be isolated from the mains for a prolonged period, then the MC and any storage tanks or vessels should be drained and left dry, the pumps should be removed from the hydraulic module to ensure all water is drained from the pump housings. Before putting the system back in to operation, a full risk assessment should be undertaken to ensure safe operation, with particular attention paid to water supply quality. Additionally a complete system service has to be performed prior to putting the system back in to operation.

7 Maintenance

7.1 Important notes on maintenance

Qualification of personnel

All maintenance work must be carried out only by well qualified and trained personnel authorised by the owner. It is the owner's responsibility to verify proper qualification of the personnel.

General notes

The instructions and details for maintenance work must be followed and upheld. Only carry out the maintenance work described in this documentation.

The Condair MC must be maintained in the prescribed intervals, the cleaning work must be carried out correctly.

For safety and warranty reasons, only use original spare parts from your Condair representative to replace defective parts or parts which have elapsed their lifetime.

Safety and hygiene

Some maintenance work requires removal of the unit cover. Please note the following:



DANGER!
Danger of electric hazard!

Before carrying out any maintenance work take the Condair MC out of operation as described in [chapter 6.7](#) and secure the system against inadvertent power-up. In addition take AHU out of operation as described in the operation instructions of the AHU and secure the AHU against inadvertent power-up.



CAUTION!

The electronic components inside the control unit are very sensitive to electrostatic discharge.

Prevention: Before carrying out any maintenance work to the electrical or electronic equipment of the control unit, appropriate measures must be taken to protect the respective components against damage caused by electrostatic discharge (ESD protection).



DANGER!
Health risk by inadequate maintenance!

Inadequately operated and/or poorly maintained adiabatic humidification/cooling systems may endanger health. When inadequately operated and/or poorly maintained, micro-organisms (including the bacterium which causes Legionnaire's disease) may grow in the water system and in the area of the humidification unit and may affect the air in the AHU/air duct.

Prevention: the adiabatic air humidification /air cooling system Condair MC must be correctly operated as described in [chapter 6](#), and must be correctly maintained and cleaned in the prescribed intervals as described in [chapter 7](#).



DANGER!
Health risk by inadequate maintenance!

Damaged systems / components may present a danger to life, or cause damage to material assets. We advise that the customer routinely checks the system and components for damage. It is particularly important that the tank, structural components, and fixings (such as studs) are inspected as damage to these items could affect the structural integrity of the system. Please contact your local Condair representative immediately in the event of discovering damaged components.

7.2 Maintenance intervals

In order to maintain operational safety and hygienic demands the Condair MC must be serviced at regular intervals. The time interval for the complete system service is to be adapted to the operating conditions. The hygiene status depends mainly on the quality of the humidifier water but also on the adherence to the exchange intervals of the upstream air filter, the air velocity and the micro-biological and chemical composition of the supply air. Therefore the service intervals must be determined for each system separately.

The interval time for a complete system service is to be determined at commissioning.

Depending on the encountered hygiene status when performing a complete system service the interval time must be decreased or increased.

In any case the Condair MC system should receive a complete service at least once annually.

Note: We recommend to perform a minor service between two complete system service.

7.3 Maintenance guide

The Condair MC unit will form part of your hot and cold water system and as such require you to undertake certain duties with regards to local regulations and bylaws concerning the control of Legionella microbes in water systems. Your water sampling / testing and disinfection regime must be based on results of a site specific risk assessment.

If any further assistance is required or you are interested in a planned maintenance quote, please contact your Condair distributor.

Note: routine water sampling and testing is not included as part of a Condair service contract.

Please note that the information given in the table below is only to act as a guide which shows the work to be carried out on "Interim Service" and "Complete System Service".

Correct maintenance is vital to ensure optimum output, reliability and safety.

Operations	Interim Service	Complete System Service
Check water inlet solenoid valve	Yes	Yes
Replace inlet flow restrictor	-	Yes
Check all hoses and connectors	Yes	Yes
Replace all distribution hoses	-	Yes
Check distribution headers	Yes	Yes
Clean distribution headers	-	Yes
Clean pumps & pump housings	-	Yes
Clean front section of tank	Yes	Yes
Clean internal of hydraulic module (use soft cloth only)	Yes	Yes
Check operation of level float	Yes	Yes
Clean level float	-	Yes
Check droplet separator (if applicable) and evaporator cassettes in suitable condition	Yes	Yes
Lightly brush evaporator cassettes if necessary, replace if heavily soiled	-	Yes
Remove evaporator cassettes and clean all sections of tank and frame structure	-	Yes
Check and secure frame structure and seal	-	Yes
Run unit and check for correct water level	Yes	Yes
Check all media for full saturation	Yes	Yes
Check operation of all distribution pumps	Yes	Yes
Measure flow rates to distribution headers	-	Yes
Check and secure all electrical connections	Yes	Yes
Check overall installation for leaks and damage	Yes	Yes
Check operation of submerged UV lamps	Yes	Yes
Replace UV lamps	-	Yes
Check any options as per relevant documentation	Yes	Yes
Complete disinfection as described in this manual	Yes	Yes
Check safety interlock and humidity/temperature control devices	-	Yes
Check air velocity at face of evaporative cassettes media	-	Yes
Reset all appropriate maintenance counters	Yes	Yes
Update service log book	Yes	Yes
Add disinfection chemical (according to tank volume)	Yes	Yes

7.4 Dismantling and installation of components for maintenance



A full risk assessment must be completed by suitably trained personnel prior to carrying out maintenance of the MC unit. There may be increased risk when carrying out maintenance on systems that necessitate working at height.

The following risks should be considered (this list is not exhaustive, and there may be additional site specific risks that will need to be considered):

- Manual handling
- Musculoskeletal disorders
- Electrical work
- Working at height
- Falling objects & objects dropped from higher levels
- Risks arising from the use of Mobile Elevated Work Platforms
- Risk of contact with ceilings, overhead items or asbestos roofing while using access equipment
- Adverse weather conditions
- Unsuitable surface and ground
- Other equipment, machinery or supply pipe work in the vicinity of the work area

Maintenance of the MC unit must only be carried out by trained personnel, and all tools & equipment must be checked by a skilled and competent health & safety representative.



In the event of water carry-over from the evaporative cassettes or a water leak, surfaces near the MC system may have become wet. This could result in a slipping hazard or an increased risk when handling components. If this occurs, risk assess the situation and take suitable precautions before working on the MC system. If carry-over was the cause of any standing water in the AHU/duct, follow the advice in [chapter 8.3](#) to remedy the problem.

7.4.1 Dismantling and installation of the evaporative module

1. Take the Condair MC out of operation as described in chapter 4.6 and allow to drain and dry.
2. Switch the AHU off, and isolate the power and water supply to the AHU.
3. Disconnect distribution hoses from the connectors on the distribution heads and the hydraulic module.
4. Remove droplet separator boxes (column by column):
 - Remove upper separator brackets.
 - Remove bank of separator boxes.
5. Remove distribution headers assemblies from topmost evaporative cassettes:
 - Undo the clamps fixing the distribution header assembly to the evaporative cassette.
 - Carefully lift off the distribution header assembly.
6. Remove evaporative cassettes (column by column):
 - Push box upwards and remove.
7. Remove optional UV lamp (if applicable).
8. Remove the cross member (and supports).

Clean dismantled components, water tank, frame structure, blanking plates and air duct as described in [chapter 7.8](#). If all components have been cleaned and dried, assemble the evaporative module in the reverse dismantling order. Replace any defective components with new ones.

7.5 Consumables guide

Common consumables

Description	Standard Frequency (month)
Inlet flow restrictors	24
Distribution header feed hose	24
Evaporative media cassette	
– Wholesome mains water	36
– RO water	60
Replace pump rotors (impellers)	24

Option consumables

Description	Standard Frequency (month)
UV Lamp Kit	12

Contact your Condair distributor for consumables list/order codes.

To help us ensure that the correct spares parts are sent, please confirm your unit serial and model number with your order.

7.6 Health and safety requirements

In accordance with local regulations, users must take water samples for Legionella analysis. Samples should be taken from the same places as described in [chapter 7.7](#), and the analysis carried out by an accredited laboratory which is part of an appropriately certified Legionella testing scheme. In the event that the Legionella content exceeds 100 cfu/l, the humidifier should be switched off and specialist advice sought regarding its disinfection.

1. If biofilm (a slimy or gel-like deposit when wet, which might be dry and crisp in a dry system) is found during any inspection of the humidifier or water system, the humidifier **MUST** be switched off as per the instruction in [chapter 6.7](#) and not put back into operation until the system has been taken apart, scrubbed and thoroughly cleaned with a suitable biocide with biofilm penetrating qualities such as a 5-7.5 % concentration Hydrogen Peroxide based solution. This work should only be carried out by fully trained specialist organizations or individuals.
2. The control unit of the Condair MC must be left powered on to allow automatic flushing and cleaning cycles to occur. If the control unit Condair MC is powered off for prolonged periods, water stagnation might occur and contamination result, so the system, including the pump housings and any storage tanks or vessels should be drained and left dry. Before putting the system back into service, the water pipe work supplying the Condair MC should be purged carefully, avoiding the creation of aerosols by splashing, and a water sample should be taken to ensure cleanliness. In the event that the humidifier pipe work contains any residual water or has remained damp, and the temperature exceeded 20 °C (68 °F), the Condair MC should be disinfected using an appropriate solution.

Contact your Condair representative for advice on water sampling and analysis, disinfection of systems, service and maintenance.

7.7 Routine water sampling and testing

Hygiene

Your attention is drawn to local regulations and bylaws regarding the control of Legionellosis in water systems. If inadequately maintained, water systems, of which any humidifier is a part, can support the growth of micro-organisms, including the bacterium that causes Legionnaires' disease. Condair has considered all aspects of this equipment to reduce as far as possible the risk of Legionnaires' disease and other similar conditions, but it is important that users are aware of their responsibilities under local regulations in reducing the risk of Legionellosis.

To prevent the growth of Legionella, users are required to:

1. Carry out a risk assessment of the water system using a competent person, and implement an appropriate monitoring and control regime.
2. Avoid water temperatures which favour the growth of Legionella.
3. Avoid water stagnation.
4. Clean and disinfect the system in accordance with local regulations and bylaws, and the instructions in this manual.
5. The Condair MC system must be connected to a clean, wholesome mains water supply and it is recommended that the supply water is chlorinated. It is the responsibility of the user to ensure that the water system complies with local regulations and bylaws, particularly those for the control of Legionella microbes. The use of mains water fed tanks and reservoirs is only permitted as part of a managed water treatment system.

On commissioning and at regular intervals thereafter, test for possible water contamination using dipslides. Take samples from the water supply, the evaporative cassettes and from the tank. Check for biofilm.

The dipslides should be incubated for 2 days at 30 °C (86 °F).

1. If the microbial count from the tank exceeds 10^3 cfu/ml, the system should be turned off, any biofilm scrubbed clean and then disinfected using a 5-7.5 % concentration Hydrogen Peroxide based solution for one hour before being put back into use.
2. If the microbial count in the water supply to the evaporative module exceeds 10^3 cfu/ml, this suggests contamination of the water system within the building. The system should be turned off and you should seek specialist advice on cleaning your water supply.
3. If the water temperature anywhere in the system regularly exceeds 20 °C, (68 °F) increase the frequency of water sampling. The frequency may be reduced if successive tests show a consistent level below 10^3 cfu/ml.

7.8 Cleaning and disinfection

Before commencing cleaning and disinfection:

At initial commissioning we recommend the use of a mild disinfection solution, which should be placed in the tank and circulated around the system.

For systems in operation or where the water quality or air quality is poor, it is recommended to dismantle and scrub the system clean, to carry out a disinfection with a 5-7.5 % concentration Hydrogen Peroxide based or other appropriate disinfection solution circulated for 1 hour minimum (or the time recommended by the disinfectant manufacturer if not using Hydrogen Peroxide). Please refer to the cleaning and disinfection and method statement section to ensure that the relevant chemicals, equipment and Personal Protective Equipment are available to carry out disinfection.

1. A qualified person appointed by the customer must risk assess the cleaning and disinfection operation. This assessment should include but is not limited to observance of local regulations and the use of PPE, working from heights and ensuring a full understanding of the Condair MC.
2. Coordinate with relevant responsible persons.
3. Check records (i.e sample results of microbiological control) for system history.
4. If possible, disinfection should be carried out when the building is unoccupied, with air flow off.

Evaporative humidifiers must be regularly cleaned and maintained, to prevent contamination especially in industrial environments.

All surfaces requiring disinfection or cleaning must be in contact with the appropriate concentration of disinfection solution for the correct contact period. The method statement for disinfection may need to be adapted depending on the layout of the humidifier pipe work. Additional procedures will be required for supply water system pipe work or water treatment systems prior to the humidifier.

Condair recommends that routine disinfection should take place in the following situations:

- At initial commissioning (for brand new systems use a mild disinfection chemical).
- At six monthly intervals as part of the maintenance regime.
- If the system or part of it has been shutdown and/or substantially altered creating a risk of contamination.
- During or following any increase of bacterial activity (as per recommendations in [chapter 7.7](#)) or outbreak or suspected outbreak of Legionellosis.

Recommended disinfection equipment:

- Disinfection solution in accordance with manufacturers guidelines.
- Disinfection neutralizer (only if necessary).
- Disinfection solution test kit (to measure strength).
- Bucket of fresh water.
- Cleaning equipment.
- Mixing vessel / Measuring container.
- Risk assessment / test record sheets. Appropriate report/record
- Standard tools
- Appropriate PPE
- COSHH risk assessment / MSDS

7.9 Cleaning and disinfection method statement



WARNING!

Disinfectants can be corrosive, toxic or irritant. Use of disinfectants may present a risk to health and could harm the environment.

Step 1 – Refer to the cleaning and disinfection risk assessment

- If the unit is already in operation, check for correct operation.
- Ensure the Condair MC system and the AHU are OFF and isolated.
- If the system has been without power for more than 48 hours, flush the water supply.
- Ensure the area is well ventilated.
- Refer to the manufacturers instructions and safety advice for chosen disinfectant.
- If there are concerns over the level of biofilm or bacteria in the system, disinfect the tank before starting cleaning work.
- Scrub tank fully. For more thorough disinfection remove droplet separator banks (if applicable) and the evaporative cassettes to allow better access to the tank (refer to maintenance section)
- Scrub hydraulic module inside fully. Also scrub inside the pump housings, clean the pump impellers, clean the level sensor. Take care not to damage the level sensor.
- Consider appropriate maintenance requirements at this time including parts replacement i.e. replacing distribution hoses to ensure that these are also disinfected.
- Re-assemble the Condair MC (refer to installation manual).

Step 2 – Mix disinfection solution

- Mix disinfection solution following the manufacturers instructions. Recommended a 5-7.5 % concentration Hydrogen Peroxide based solution circulated for 1 hour minimum or appropriate time. NB: For larger or particularly unclean systems this process may need to be repeated.
- Calculate the total water volume of the system.
- **Note:** Solution loses strength over time and the solution may need to be increased through the process or the disinfection process may need to be repeated.

Step 3 – Run the unit

- Switch the control unit on.
- Send a demand to the unit to start it running.
- Check that the evaporative cassettes become fully saturated, and the system is operating correctly.

Step 4 – Add disinfection solution

- Add the disinfection solution to the water tank and allow to flow through the evaporative cassettes.
- Measure the strength of the disinfection solution and check it is the correct strength in accordance with manufacturers guidelines.
- Note the strengths of the disinfection solution at 15 minute intervals and record on a record appropriately.
- Adjust solution strength as required.

Step 5 – Circulate disinfection solution

- Check all surfaces are wetted for desired time and correct solution.

Step 6 – Neutralise the disinfection solution – if required based on chemical used



WARNING!

If a neutralizing solution is required, always ensure that the neutralizing solution is used in accordance with the manufacturer's guidance. Failure to follow the manufacturer's guidance with regard to neutralizing the disinfection chemical may present a risk to health.

- Mix neutralizing agent as manufacturers instructions.
- Allow the neutralizing agent to disperse over the media and circulate in the tank.
- Drain and measure the strength as per MSDS until the disinfection solution is down to desired strength.

Step 7 – Drain the unit into foul drain

- Switch off Condair MC at <Switch On/Off>.
- Isolate power to the MC system to open the drain valve, let run until empty into appropriate drain (depending on Risk Assessment) and rinse the tank if necessary.
- Fill and drain unit including flushing over the evaporative cassettes and test to ensure that the chemical is removed to the appropriate level.
- Wipe tank clean.
- Test for correct operation as per commissioning section of the manufacturers manual.
- Check for and complete maintenance requirements as per manufacturers instructions.
- Add a mild disinfectant chemical to the tank.
- Always leave work area clean, dry and tidy.

Step 8 – Re-start the Condair MC system

- Refer to the commissioning section of this manual.

If in doubt always contact your Condair distributor.

8 Fault elimination

8.1 Fault indication on Condair MC control unit

Malfunctions during operation detected by the control software are indicated by a corresponding sequence of flashes of the LED in the front panel of the control unit:

LED Color	LED Behavior	Unit Status
Green	Solid	System Enabled, In Demand, No Faults
	Flashing	System Enabled, No Demand, No Faults
Amber	Solid	Enable open
	Flashing - 3 pulses	Pump Fault
	Flashing - 2 pulses	Fill timeout recovery attempt
Red	Flashing - 1 pulse	Drain timeout
	Flashing - 2 pulses	Fill timeout

8.2 Malfunction list

Important! Most operational malfunctions are not caused by faulty equipment but rather by improper installation or disregarding of planning guidelines. Therefore, a complete fault diagnosis always involves a thorough examination of the entire system. Often, the installation of the evaporative module has not been properly executed, or the fault lies with the humidity/temperature control system.

Malfunction	Information	
	Possible causes	Remedy
Enable open	The Condair MC stopped operating as an external device opened the enable e.g. BMS control, ventilation interlock, safety humidistat, etc.. Note: If – at any time – the enable is closed again, the system will continue with normal operation.	
	External Enable switch open	Check BMS for operation of switch
	Device in external chain has activated, e.g. safety humidistat, interlock	Check external device operation.
Pump Fault	The controller was not able to activate one or more stage pumps. The Condair MC will continue to attempt normal operation. The affected pump can be identified by examining the Pump LEDs on the control board inside the control unit, a flashing LED indicates a fault.	
	Electrical pump connection broken.	Electrically connect or replace respective pump.
	Pump impeller worn.	Replace pump impeller.
	Pump defective	Replace defective pump.
Drain timeout	Tank drain timeout. The Condair MC stopped operation as the tank could not be drained within a preset time.	
	Drain valve blocked/defective.	Check/replace drain valve.
	Drain piping or drain trap clogged.	Check/clean drain piping and drain trap.
	Level sensor stuck or short circuited.	Check/replace level sensor.
Fill timeout	Tank (re)fill timeout. The Condair MC stopped operation as the tank could not be (re)filled within a preset time. The Condair MC periodically tries to fill the tank. Note: If – at any time – the required water level is reached, the system will continue with normal operation.	
	Water supply blocked: shut-off valve closed/clogged, water pressure too low.	Check water supply (filter, pipes, etc.), Check/open shut-off valve, Check water pressure.
	Water pressure too low.	Check water supply system.
	Water treatment unit (fully demineralized water) is regenerating.	Wait.
	Inlet solenoid valve blocked or defective.	Check/replace Inlet solenoid valve.
	Drain solenoid valve open, blocked in open position or not electrically connected (currentless open).	Check, electrically connect or replace drain solenoid valve.
	Leakage in the water drain system.	Check/seal water drain system.
	Flow restrictor blocked	Check flow restrictor in 1/2" inlet fitting.

8.3 Malfunctions without indication

Malfunction	Possible causes	Remedy
Residual water in the section of the duct downstream of the evaporative module.	Face velocity is too high.	Install droplet separator or reduce air velocity in the duct.
	Water tank, water piping or hydraulic module is leaking.	Check/seal water tank, water piping and hydraulic module.
	Water flow to media too high.	Reduce pump flow using SW1.
	Evaporative cassettes have become blocked with minerals.	Check set up, replace evaporative cassettes, perform system service.
	Uneven or non laminar air flow.	Check design conditions of AHU. Install perforated plate on the air supply side.
	Air on temperature is too low.	Check design conditions of AHU and increase temperature.
Humidity/cooling demand present however the Condair MC does not humidify.	Shut-off valve in the water supply line closed.	Open shut-off valve.
	Site control are not correct.	Prove controls and control module.
Maximum humidification/cooling capacity is not reached.	Insufficient water supply capacity.	Check water supply, increase water pressure.
	Media not fully wetted	Increase pump flow using SW1
	Evaporative cassettes have become blocked with minerals.	Check set up, replace evaporative cassettes, perform system service.

Notes on fault elimination

- For the elimination of faults set the Condair MC out of operation as described in chapter 4.6, disconnect control unit from the mains and close shut-off valve in the water supply line.
- The elimination of faults must be carried out by qualified and well trained professionals only.
- Malfunctions relating to the electrical installation (e.g. replacement of fuses) must be repaired by authorized personnel (e.g. licensed electrician) or by your Condair representative's service technician only.
- Repair work and the replacement of faulty components must be carried out by your Condair representative's service technician only!

DANGER!

Make sure the control unit is separated from the mains (check with voltage detector) and the shut-off valve in the water supply line is closed.

CAUTION!

Electronic components are very sensitive to electrostatic discharge. When carrying out repairs to the control unit, appropriate measures (ESD-protection) must be taken to prevent damage to electronic components.

8.4 Resetting the fault status on Condair MC

To reset the error indication:

1. Disconnect the control unit of the Condair MC from the mains.
2. Wait approx. 5 seconds, then reconnect the control unit to the mains.

Note: If the fault has not been eliminated, the fault indication reappears after a short while.

8.5 Replacing the fuses in the control unit

The fuses of the control unit must be replaced by authorized personnel only (e.g. electrician).

Replace fuses of the control unit only with fuses matching the specifications stated with the appropriate nominal current capacity. Never use refurbished fuses. Do not bridge the fuse holder.

To replace the fuses proceed as follows:

1. Disconnect control unit from the mains by switching off the electrical isolator and secure electrical isolator in "Off" position against inadvertent switching on.
2. Undo the screw of the front cover of the control unit, then remove the front cover.
3. Open control unit inner door.
4. Replace desired fuse.
5. Close control unit inner door.
6. Relocate front cover on control unit and lock it with the retaining screw.
7. Reconnect control to the mains by switching on the electrical isolator.

9 Taking out of service / Disposal

9.1 Taking out of service

If the Condair MC must be replaced or if the humidification system is not needed any more, proceed as follows:

1. Take the Condair MC out of operation as described in [chapter 6.7](#).
2. Have the system components unmounted by a qualified service technician.

9.2 Disposal/Recycling

Components not used any more must not be disposed of in the domestic waste. Please dispose of the individual components in accordance with local regulations at the authorised collecting point.

If you have any questions, please contact the responsible authority or your local Condair representative.

Thank you for your contribution to environmental protection.

10 Product Specifications

10.1 Technical data

Operating parameter	Range
Supply voltage control unit	110 V (UL) or 230 V (CE) / 1~ / 50/60 Hz
Supply voltage circulation pumps	24 VDC (supplied by control unit)
Power consumption	<145 W (3 stages, no options fitted)
Control signals	0...10 VDC 2...10 VDC 4...20 mA On/Off (via volt-free contact)
Control accuracy	Control accuracy depends on air conditions, control distance, water quality and on the number of On/Off cycles
Max. admissible media face velocity	4.5 m/s (886 fpm) with droplet separator
Water supply connection	1/2" G / NPT
Water drain connection	1" G / NPT
Admissible water supply pressure	Minimum of 8 l/min @ 2...5 bar (29...72.5 psi)
Admissible water temperature	5...20 °C (68 °F)
Water quality	Tap water, softened or fully demineralized water with a max. of 1000 cfu/ml
Admissible operating air temperature	10...60 °C (50...140 °F)
Admissible ambient temperature (Control unit)	1...40 °C (34...104 °F)
Admissible ambient humidity (Control unit)	max. 75 %rh
Degree of protection of Control unit	IP21
Degree of protection of Hydraulic module	IP42
Conformity	CE, UL or UKCA marking as appropriate
Fire classification of evaporative media	Glass fibre media: A2-S2,-D0 (UL Class 1)

11 Declaration of conformity



EC

Konformitätserklärung

Declaration of conformity

Déclaration de conformité

Wir,
Condair Group AG
CH-8808 Pfäffikon SZ
erklären in alleiniger Verantwortung,
dass das Produkt

We,
Condair Group AG
CH-8808 Pfäffikon SZ
declare under our sole responsibility, that
the product

Nous,
Condair Group AG
CH-8808 Pfäffikon SZ
déclarons sous notre seule
responsabilité, que le produit

Condair MC

im Seriennummernbereich

in the serial number range

pour les numéro de serie

1152773 to 4999999

auf das sich diese Erklärung bezieht,
mit den folgenden Normen oder
normativen Dokumenten
übereinstimmt

to which this declaration relates is in
conformity with the following standards or
other normative standards

auquel se réfère cette déclaration est
conforme aux normes ou autres
documents normatifs

EN 60335-1
EN 60335-2-88
EN 61000-6-2
EN 61000-6-4

und den Bestimmungen der folgenden
Richtlinien entspricht

and is corresponding to the following
provisions of directives

et est conforme aux dispositions des
directives suivantes

2006 / 42 / EC
2014 / 30 / EU

2603774 DE/EN/FR 2202

Pfäffikon, February 3, 2022

Condair Group AG

Eric Roth
Chief Technology Officer

Adrian Spörri
Corporate Systems Manager

Condair Group AG
Gwattstrasse 17
8808 Pfäffikon, Switzerland
Tel. +41 55 416 61 11, Fax +41 55 588 00 07
info@condair.com, www.condairgroup.com

Notes

CONSULTING, SALES AND SERVICE:



CH94/0002.00

Condair Group AG
Gwattstrasse 17, 8808 Pfäffikon SZ, Switzerland
Phone +41 55 416 61 11, Fax +41 55 588 00 07
info@condair.com, www.condairgroup.com

